EIA PHASE VISUAL IMPACT ASSESSMENT FOR THE PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY, MPUMALANGA PROVINCE

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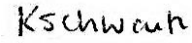

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EXECUTIVE SUMMARY

ENERTRAG South Africa (Pty) Ltd (ENERTRAG SA), is proposing to develop a green hydrogen and ammonia production facility ("the Facility") and associated overhead powerline (OHL) infrastructure near Hendrina in Mpumalanga Province. The proposed Facility is one of five sub-projects comprising the proposed Hendrina Renewable Energy Complex. These projects are:

- Hendrina North Wind Energy Facility (up to 200MW) over 3600ha;
- Hendrina South Wind Energy Facility (up to 200MW) over 2900ha;
- Hendrina North Grid Infrastructure (up to 275kV) – 15km;
- Hendrina South Grid Infrastructure (up to 275kV) – 16km;
- Green Hydrogen and Ammonia Facility (up to 25ha).

The proposed Facility is located approximately 16km east of Hendrina in Mpumalanga Province and is within the Steve Tshwete Local Municipality, in the Nkangala District Municipality.

The Project is subject to a full Environmental Impact Assessment (EIA) process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) as amended and EIA Regulations, 2014 (as amended). Accordingly, EIA processes as contemplated in terms of the EIA Regulations (2014, as amended) is being undertaken in respect of this project. The competent authority for this EIA is the Provincial Department of Economic Development, Environment and Tourism (DEDET).

This Visual Impact Assessment (VIA) is being undertaken as part of the EIA process. This VIA has been conducted with the aim of identifying potential visual issues associated with the Facility and OHL infrastructure and determining the potential extent of visual impacts. This study characterizes the visual environment of the area and identifies areas of potential visual sensitivity, with the main focus on the potentially sensitive visual receptor locations. In addition, the study provides an assessment of the magnitude and significance of the visual impacts associated with the Facility and the associated infrastructure.

The VIA has determined that the study area has a somewhat mixed visual character, transitioning from the heavily transformed landscape associated with the collieries and associated mining activities to the south-west of the proposed development, to a more rural / pastoral character across the remainder of the study area. Hence, although the Facility and OHL infrastructure would alter the visual character and contrast with this rural / pastoral character, the location of the development in relatively close proximity to mining activities and the associated powerline and rail infrastructure will significantly reduce the level of contrast.

A broad-scale assessment of visual sensitivity, based on the physical characteristics of the study area, economic activities and land use that predominates, determined that the area would have a **low** visual sensitivity. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs. No formal protected areas, leisure-based tourism activities or ***sensitive*** receptor locations were identified in the study area, thus confirming the low level of visual sensitivity.

The desktop assessment did however identify multiple farmsteads and residences within the study area that are considered to be receptors, although not all of them would be sensitive to the proposed development. These farmsteads are however regarded as *potentially* sensitive visual receptors as elements of the proposed

development could potentially alter natural or semi-natural vistas experienced from these locations. At this stage however, local sentiments towards the proposed development are not known.

Only fourteen (14) potentially sensitive receptors were identified within 5kms of the Facility site alternatives, none of which are considered sensitive. Four (4) of the identified receptors were found to be outside the combined viewshed for the Facility site alternatives and were excluded from the assessment. None of the remaining receptors are expected to experience high levels of visual impact. Eight (8) potentially sensitive receptors are expected to experience moderate levels of visual impact, five (5) of which are actually located within either the Hendrina North WEF or Hendrina South WEF project areas. In these cases, it has been assumed that the relevant land owners are involved in the Hendrina renewable energy complex project and as such are not expected to perceive the proposed development in a negative light. The remaining two (2) receptors would only experience low levels of visual impact as a result of the Facility.

Twenty-two (22) receptors were identified within 5kms of the combined OHL assessment corridor, none of which are considered sensitive. Five (5) of the identified receptors were found to be outside the viewshed for the OHL alternatives and were excluded from the assessment. Only one receptor is expected to experience high levels of visual impact, this being VR91. As this receptor is located within the Hendrina North WEF project area, it has been assumed that the relevant land owners are involved in the Hendrina renewable energy complex project and as such are not expected to perceive the proposed development in a negative light. Eleven (11) potentially sensitive receptors are expected to experience moderate levels of visual impact, six (6) of which are also located within either the Hendrina North WEF or Hendrina South WEF project areas. In these cases, the relevant land owners are not expected to perceive the proposed development in a negative light. The remaining five (5) receptors would only experience low levels of visual impact as a result of the OHL development.

A preliminary assessment of overall impacts revealed that impacts associated with the proposed Facility and associated OHL infrastructure (post mitigation) are of low significance during both construction and decommissioning phases. During operation however, visual impacts (post mitigation) from the Facility would be of moderate significance with relatively few mitigation measures available to reduce the visual impact. Visual impacts associated with the OHL infrastructure during operation would be of low significance.

Considering the presence of existing and proposed mining activity and electrical generation and distribution infrastructure, the introduction of this type of facility in the area will result in further change in the visual character of the area and alteration of the inherent sense of place, extending an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommended mitigation measures. In light of this, cumulative impacts have been rated as moderate.

A comparative assessment of site alternatives for the Facility was undertaken in order to determine which of the site alternatives and associated grid connection options would be preferred from a visual perspective. No fatal flaws were identified in respect of any of the site alternatives or OHL route alignments being proposed for the Project. In addition, no preference was determined for any of the Facility site alternatives, although GHAF Site Alternative 3 was found to be **Least Preferred**.

From a visual perspective therefore, the proposed Hendrina Green Hydrogen and Ammonia Facility and the associated overhead powerline infrastructure is deemed acceptable and the Environmental Authorisation (EA) should be granted. SLR is of the opinion that the visual impacts associated with the construction, operation and decommissioning phases can be mitigated to acceptable levels provided the recommended mitigation measures are implemented.

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ACRONYMS AND ABBREVIATIONS

Acronym / Abbreviation	Definition
BA	Basic Assessment
DBAR	Draft Basic Assessment Report
DEIAR	Draft Environmental Impact Assessment Report
DEDET	Department of Economic Development, Environment and Tourism
DEM	Digital Elevation Model
DFFE	Department of Forestry, Fisheries and Environment
DM	District Municipality
DSR	Draft Scoping Report
DTM	Digital Terrain Model
EA	Environmental Authorisation
EIA	Environmental Impact Assessment
EMP	Environmental Management Plan
FEIAR	Final Environmental Impact Assessment Report
FSR	Final Scoping Report
GHAF	Green Hydrogen and Ammonia Facility
GIS	Geographic Information System
I&AP	Interested and/or Affected Party
IPP	Independent Power Producer
LM	Local Municipality
kV	Kilovolt
MW	Megawatt
NGI	National Geo-Spatial Information
OHL	Overhead Powerlines
REF	Renewable Energy Facility
REIPPP	Renewable Energy Independent Power Producer Programme
SACAA	South African Civil Aviation Authority
SANBI	South African National Biodiversity Institute
SEF	Solar Energy Facility
VIA	Visual Impact Assessment
VR	Visual Receptor
WEF	Wind Energy Facility

DEFINITIONS

Anthropogenic feature: An unnatural feature resulting from human activity.

Cultural landscape: A representation of the combined worlds of nature and of man illustrative of the evolution of human society and settlement over time, under the influence of the physical constraints and/or opportunities presented by their natural environment and of successive social, economic and cultural forces, both external and internal (World Heritage Committee, 1992).

Sense of place: The unique quality or character of a place, whether natural, rural or urban. It relates to uniqueness, distinctiveness or strong identity.

Scenic route: A linear movement route, usually in the form of a scenic drive, but which could also be a railway, hiking trail, horse-riding trail or 4x4 trail.

Sensitive visual receptors: An individual, group or community that is subject to the visual influence of the proposed development and is adversely impacted by it. They will typically include locations of human habitation and tourism activities.

Sky Space: The area in which the turbine rotors would rotate.

Slope Aspect: Direction in which a hill or mountain slope faces.

Study area / Visual Assessment Zone: The area with a zone of 10km from the outer boundary of the proposed WEF application site, and 5km from the proposed grid connection corridor alternatives.

Viewpoint: A point in the landscape from where a particular project or feature can be viewed.

Viewshed / Visual Envelope: The geographical area which is visible from a particular location.

Visual character: The pattern of physical elements, landforms and land use characteristics that occur consistently in the landscape to form a distinctive visual quality or character.

Visual contrast: The degree to which the development would be congruent with the surrounding environment. It is based on whether or not the development would conform with the land use, settlement density, forms and patterns of elements that define the structure of the surrounding landscape.

Visual exposure: The relative visibility of a project or feature in the landscape.

Visual impact: The effect of an aspect of the proposed development on a specified component of the visual, aesthetic or scenic environment within a defined time and space.

Visual receptors: An individual, group or community that is subject to the visual influence of the proposed development but is not necessarily adversely impacted by it. They will typically include commercial activities, residents and motorists travelling along routes that are not regarded as scenic.

Visual sensitivity: The inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (visual character), spatial distribution of potential receptors, and the likely value judgements of these receptors towards the new development, which are usually based on the perceived aesthetic appeal of the area.

Visual Impact Assessment for The Proposed Hendrina Green Hydrogen and Ammonia Facility, Mpumalanga Province

1. INTRODUCTION

ENERTRAG South Africa (Pty) Ltd (ENERTRAG SA), proposes is proposing to develop a green hydrogen and ammonia production facility ("the Facility") and associated overhead powerline (OHL) infrastructure near Hendrina in Mpumalanga Province. The proposed Facility is one of five sub-projects comprising the proposed Hendrina Renewable Energy Complex. These projects are:

- Hendrina North Wind Energy Facility (up to 200MW) over 3600ha;
- Hendrina South Wind Energy Facility (up to 200MW) over 2900ha;
- Hendrina North Grid Infrastructure (up to 275kV) – 15km;
- Hendrina South Grid Infrastructure (up to 275kV) – 16km;
- Green Hydrogen and Ammonia Facility (up to 25ha).

The proposed development will be subject to a full Environmental Impact Assessment (EIA) process in terms of the National Environmental Management Act (Act 107 of 1998) (NEMA) as amended and EIA Regulations, 2014 (as amended). Accordingly, an EIA process as contemplated in terms of the EIA Regulations (2014, as amended) is being undertaken in respect of the proposed Facility. The competent authority for this EIA is the provincial Department of Economic Development, Environment and Tourism (DEDET).

Specialist studies have been commissioned to assess and verify the proposed development under the new Gazetted specialist protocols[1].

1.1 SCOPE AND OBJECTIVES

This Visual Impact Assessment (VIA) is being undertaken as part of the EIA process. The aim of this report is to present the preliminary findings of the visual specialist assessment and to provide specialist inputs to the Draft Environmental Impact Report (DEIR) for the Hendrina Green Hydrogen and Ammonia Facility (GHAF). The assessment will identify potential visual issues associated with the development of the proposed Facility and OHL infrastructure, as well as to determine the potential extent of visual impacts. This will be achieved by determining the character of the visual environment and identifying areas of potential visual sensitivity that may be subject to visual impacts. The visual assessment focuses on the potentially sensitive visual receptor locations and provides an assessment of the magnitude and significance of the visual impacts associated with the Facility and OHL infrastructure.

1.2 SPECIALIST CREDETIALS

This VIA was undertaken by Kerry Schwartz, a GIS specialist with more than 25 years' experience in the application of GIS technology in various environmental, regional planning and infrastructural projects. Kerry's GIS and spatial analysis skills have been extensively utilised in projects throughout South Africa and in other Southern African countries. Kerry has also undertaken many VIAs in recent years and the relevant VIA project experience is listed in the table below.

[1] Formally gazetted on 20 March 2020 (GN No. 320)

A Curriculum Vitae and a signed specialist statement of independence are included in Appendix A of this specialist assessment.

Table 1: Relevant Project Experience

Visual Specialist	SLR Consulting – Kerry Schwartz
Contact Details	klschwartz@slrconsulting.com
Qualifications	BA (Geography), University of Leeds 1982
VIA Expertise	• Combined VIA for the Hendrina Renewable Energy Complex, near Hendrina, Mpumalanga Province. • VIAs for the Camden Renewable Energy Complex, near Camden, Mpumalanga Province. • VIAs (EIAs) for the proposed Koup 1 and Koup 2 WEFs and associated Grid Connection Infrastructure, near Beaufort West, Western Cape Province. • VIA (EIA) for the proposed Oya Energy Facility near Matjiesfontein, Western Cape Province; • VIA (BA) for the proposed construction of 132kV power lines to serve the authorised Loeriesfontein 3 PV Solar Energy Facility near Loeriesfontein, Northern Cape Province; • VIA (BA) for the proposed construction of the Oya 132kV power line near Matjiesfontein, Northern and Western Cape Provinces; • VIAs (BA) for the proposed Gromis WEF and associated Grid Connection Infrastructure, near Komaggas, Northern Cape Province. • VIAs (BA) for the proposed Komas WEF and associated Grid Connection Infrastructure, near Komaggas, Northern Cape Province. • VIAs (Scoping and Impact Phase) for the proposed Mooi Plaats, Wonderheuvel and Paarde Valley solar PV plants near Noupoort in the Northern and Eastern Cape Provinces. • VIAs (Scoping and Impact Phase) for the proposed Sendawo 1, 2 and 3 solar PV energy facilities near Vryburg, North West Province. • VIAs (Scoping and Impact Phase) for the proposed Tlisitseng 1 and 2 solar PV energy facilities near Lichtenburg, North West Province. • VIA for the proposed Nokukhanya 75MW Solar PV Power Plant near Dennilton, Limpopo Province. • VIAs (Scoping and Impact Phase) for the proposed Helena 1, 2 and 3 75MW Solar PV Energy Facilities near Copperton, Northern Cape Province. • VIA (EIA) for the proposed Paulputs WEF near Pofadder in the Northern Cape Province. • VIA (EIA) for the proposed development of the Rondekop WEF near Sutherland in the Northern Cape Province. • VIA (BA) for the proposed development of the Tooverberg WEF near Touws Rivier in the Western Cape Province. • VIA (BA) for the proposed development of the Kudusberg WEF near Sutherland, Northern and Western Cape Provinces. • VIA (Scoping and Impact Phase) for the proposed development of the Kuruman Wind Energy Facility near Kuruman, Northern Cape Province.

	• VIA (Scoping and Impact Phase) for the proposed development of the Phezukomoya Wind Energy Facility near Noupoort, Northern Cape Province. • VIA (Scoping and Impact Phase) for the proposed development of the San Kraal Wind Energy Facility near Noupoort, Northern Cape Province. • VIAs (Scoping and Impact Phase) for the proposed Graskoppies Wind Farm near Loeriesfontein, Northern Cape Province. • VIAs (Scoping and Impact Phase) for the proposed Hartebeest Leegte Wind Farm near Loeriesfontein, Northern Cape Province. • VIAs (Scoping and Impact Phase) for the proposed Ithemba Wind Farm near Loeriesfontein, Northern Cape Province. • VIAs (Scoping and Impact Phase) for the proposed Xha! Boom Wind Farm near Loeriesfontein, Northern Cape Province

1.3 ASSESSMENT METHODOLOGY

This VIA is based on a combination of desktop-level assessment supported by field-based observation.

1.3.1 Physical landscape characteristics

Physical landscape characteristics such as topography, vegetation and land use are important factors influencing the visual character and visual sensitivity of the study area. Baseline information about the physical characteristics of the study area was initially sourced from spatial databases provided by NGI, the South African National Biodiversity Institute (SANBI) and the South African National Land Cover Dataset (Geoterraimage – 2020). The characteristics identified via desktop means were later verified during the site visit.

1.3.2 Identification of sensitive receptors

Visual receptor locations and routes that are sensitive and/or potentially sensitive to the visual intrusion of the proposed development were identified and assessed in order to determine the impact of the proposed development on these receptor locations.

1.3.3 Fieldwork and photographic review

A two (2) day site visit was undertaken between the 16th and the 17th of September 2019 (late winter). The purpose of the site visit was to:

- verify the landscape characteristics identified via desktop means;
- conduct a photographic survey of the study area;
- verify, where possible, the sensitivity of visual receptor locations identified via desktop means;
- eliminate receptor locations that are unlikely to be influenced by the proposed development;
- identify any additional visually sensitive receptor locations within the study area; and
- inform the impact rating assessment of visually sensitive receptor locations (where possible).

1.3.4 Visual / Landscape Sensitivity

GIS technology was used to identify any specific areas of potential visual sensitivity affecting the site alternatives for the Facility and the associated powerline assessment corridors. These would be areas where the placement of the proposed facility and powerlines would result in the greatest probability of visual impacts on potentially sensitive visual receptors.

In addition, the National Environmental Screening Tool[2] was examined to determine any relative landscape sensitivity in respect of the proposed development.

1.3.5 Impact Assessment

A rating matrix was used to provide an objective evaluation of the significance of the visual impacts associated with the proposed development, both before and after implementing mitigation measures. Mitigation measures were identified (where possible) in an attempt to minimise the visual impact of the proposed development. The rating matrix considers a number of different factors including geographical extent, probability, reversibility, irreplaceable loss of resources, duration and intensity, in order to assign a level of significance to the visual impact of the project.

A separate rating matrix was used to assess the visual impact of the proposed development on each visual receptor location (both sensitive and potentially sensitive), as identified. This matrix is based on three (3) parameters, namely the distance of an identified visual receptor from the proposed development, the presence of screening factors and the degree to which the proposed development would contrast with the surrounding environment.

1.3.6 Consultation with I&APs

Continuous consultation with Interested and Affected Parties (I&APs) undertaken during the public participation process will be used (where available) to help establish how the proposed development will be perceived by the identified receptors and the degree to which the impact will be regarded as negative. Although I&APs have not yet provided any feedback in this regard, this report will be updated to include relevant information as and when it becomes available.

1.4 SOURCES OF INFORMATION

The main sources of information utilised for this VIA included:

- Project description for the proposed development provided by the proponent;
- Elevation data from 25m Digital Elevation model (DEM) from the National Geo-Spatial Information (NGI);
- 1:50 000 topographical maps of South Africa from the NGI;
- Land cover and land use data extracted from the 2020 South African National Land-Cover Dataset provided by GEOTERRAIMAGE;
- Vegetation classification data extracted from the South African National Biodiversity Institute's (SANBI's) VEGMAP 2018 dataset;
- Google Earth Satellite imagery 2022;
- South African Renewable Energy EIA Application Database from Department of Environmental Affairs (incremental release Quarter 3 2022);
- The National Web-Based Environmental Screening Tool, Department of Forestry, Fisheries and Environment (DFFE);

[2] https://screening. environment.gov.za/screeningtool/

2. ASSUMPTIONS AND LIMITATIONS

- Given the nature of the receiving environment and the assumed height of certain components of the Facility and associated grid infrastructure, the **study area or visual assessment** zone is assumed to encompass an area of 5km from the boundaries of the three proposed site alternatives, and 5km from the outer boundary of the combined powerline assessment corridor. This limit on the visual assessment zone relates to the fact that visual impacts decrease exponentially over distance. Thus, although the higher elements of the Facility and the powerline towers may theoretically still be visible beyond 5km, the degree of visual impact would diminish considerably. As such, the need to assess the impact on potential receptors beyond this distance would not be warranted.

- The identification of visual receptors involved a combination of desktop assessment as well as field-based observation. Initially Google Earth imagery was used to identify potential receptors within the study area. Where possible, these receptor locations were verified and assessed during a site visit which was undertaken in September 2019. Due to the extent of the study area however and the number of receptors that could potentially be sensitive to the proposed development, it was not possible to visit or verify every potentially sensitive visual receptor location. As such, several broad assumptions have been made in terms of the likely sensitivity of the receptors to the proposed development.

- It should be noted that not all receptor locations would necessarily perceive the proposed development in a negative way. This is usually dependent on the use of the facility, the economic dependency of the occupants on the scenic quality of views from the facility and on people's perceptions of the value of "Green Energy". Sensitive receptor locations typically include sites such as tourism facilities and scenic locations within natural settings which are likely to be adversely affected by the visual intrusion of the proposed development. Thus, the presence of a receptor in an area potentially affected by the proposed development does not necessarily mean that any visual impact will be experienced.

- The potential visual impact at each sensitive visual receptor location was assessed using a matrix developed for this purpose. The matrix is based on three main parameters relating to visual impact and, although relatively simplistic, it provides an indicative assessment of the degree of visual impact likely to be experienced at each receptor location as a result of the proposed development. It is however important to note the limitations of quantitatively assessing a largely subjective or qualitative type of impact and as such the matrix should be seen merely as a representation of the likely visual impact at a receptor location.

- As stated, the exact status of all the receptors could not be verified during the field investigation and as such the receptor impact rating was largely undertaken via desktop means.

- Where receptors have been identified within the Hendrina North or South Wind Energy Facility project areas, it has been assumed that the land owners or residents at these locations support the proposed renewable energy development and would not view the project in a negative light.

- Based on the project description provided by the Proponent, visual analysis for the Facility is based on a worst-case scenario where the highest structure associated with the Facility (Air Separation Unit) is assumed to be 40m.

- Visual analysis in respect of the powerlines is based on a worst-case scenario where power line tower heights are assumed to be 35 m.

- Due to the varying scales and sources of information; maps may have minor inaccuracies. Terrain data for this area, derived from the National Geo-Spatial Information (NGI)'s 25m Digital Elevation Model (DEM), is fairly coarse and somewhat inconsistent and as such, localised topographic variations in the landscape may not be reflected on the DEM used to generate the viewshed(s) and visibility analysis conducted in respect of the proposed development.

- In addition, the viewshed / visibility analysis does not consider any existing vegetation cover or built infrastructure which may screen views of the proposed development. This analysis should therefore be seen as a conceptual representation or a worst-case scenario.

- No feedback regarding the visual environment has been received from the public participation process to date. Any feedback from the public during the review period of the Draft EIA Report (DEIR) for the Facility and OHL infrastructure will however be incorporated into further drafts of this report, if relevant.

- At the time of undertaking the visual study no details were available regarding the type and intensity of lighting that will be required for the proposed Facility and therefore the potential impact of lighting at night has not been assessed at a detailed level. General measures to mitigate the impact of additional light sources on the ambiance of the nightscape have however been provided.

- In the light of the fact that green hydrogen facilities are still relatively new in South Africa, this report is based on assumptions as to the likely generic impacts associated with the proposed development.

- This study includes an assessment of the potential cumulative impacts of other renewable energy and infrastructural / mining developments on the existing landscape character and on the identified sensitive receptors. This assessment is based on the information available at the time of writing the report and where information has not been available, broad assumptions have been made as to the likely impacts of these developments.

- It should be noted that the fieldwork for this study was undertaken in mid-September 2019, during late winter which is characterised by low levels of rainfall and reduced vegetation cover. In these conditions, increased levels of visual impact will be experienced from receptor locations in the surrounding area.

- The overall weather conditions in the study area have certain visual implications and are expected to affect the visual impact of the proposed development to some degree. In clear weather conditions, the Facility and powerlines would present a greater contrast with the surrounding environment than they would on an overcast day. Although the field investigation was conducted during clear weather conditions, localised pollution in the study area resulted in relatively hazy skies which would reduce the visibility of the Facility.

3. TECHNICAL DESCRIPTION

3.1 PROJECT LOCATION

The proposed Facility is located approximately 16km east of Hendrina in Mpumalanga Province (**Figure 1**) and is within the Steve Tshwete Local Municipality, in the Nkangala District Municipality.

All three proposed development alternatives are located within the Hendrina North WEF and / or the Hendrina South WEF project areas (**Figure 2**)

3.2 PROJECT TECHNICAL DETAILS

The proposed Facility is being developed for the production of commercially usable green hydrogen and ammonia. “Green” Hydrogen and ammonia production differs from traditional production technologies in that the process relies exclusively on renewable resources to provide the energy required for the process, hence this development is integrally linked to the Hendrina Renewable Energy Complex development as a whole.

The production, storage and transport of hydrogen and ammonia is an industry that is undergoing research and development and technological solutions are constantly being improved. Accordingly, the Facility description provided below is based on technological solutions presently available.

The Facility is expected to comprise the following general components:

- Water treatment unit;
- Electrolyser unit;
- Air separator;
- Ammonia processing unit;
- Liquid air energy system (LAES) for nitrogen storage;
- Feedstock and product storage;
- Utilities;
- Gantry and loading bay.

Associated infrastructure includes:

- Electrical infrastructure required for power supply to the facility.
- Temporary and permanent laydown areas required for temporary storage and assembly of components and materials.
- Access road/s to the site and internal roads between project components, with a width of up to up to 6m wide respectively.

- Fencing and lighting.
- Lightning protection.
- Telecommunication infrastructure.
- Stormwater channels.
- Water pipelines
- Offices.
- Operational control centre.
- Operation and Maintenance Area / Warehouse / workshop.
- Ablution facilities.
- A gate house.
- Control centre, offices, warehouses.
- Security building.

3.2.1 Site Alternatives

Three possible alternatives are presently being considered for the Facility and associated overhead powerlines (OHPs), as outlined below.

Site Alternative 1

This alternative (**Figure 3**) is located on Portion 3 of the Farm Dunbar 189IS, at the site of an old abandoned farmyard and has three powerline options from the associated Hendrina North and South Wind Energy Facilities ("WEF") as follows:

- Powerline option 1 is up to 2km in length, to the Hendrina North WEF substation Option 1 on Portion 1 of the Farm Dunbar 189IS;
- Powerline option 2 is up to 7km in length, to the Hendrina North WEF substation Option 2 on Portion 3 of the Farm Hartebeestkuil 185IS;
- Powerline option 3 is up to 1.5km in length, to the Hendrina South WEF substation on Portion 3 of the Farm Dunbar 189IS.

Site Alternative 2

This alternative (**Figure 4**) is located on Portion 3 of the Farm Dunbar 189IS and Portion 18 of the Farm Weltevreden 193IS, adjacent to the proposed Hendrina South WEF substation and has three powerline options from the associated wind farms as follows:

- Powerline option 1 is up to 3km in length to the Hendrina North WEF Option 1 substation on Portion 1 of the Farm Dunbar 189IS;
- Powerline option 2 is up to 8km in length to the Hendrina North WEF substation Option 2 on Portion 3 of the Farm Hartebeestkuil 185IS;
- Powerline option 3 is up to 0.5km in length to the Hendrina South WEF substation on Portion 3 of the Farm Dunbar 189IS;

Site Alternative 3

This alternative (**Figure 5**) is located on Portions 14 and 15 of the Farm Weltevreden 193IS and has three powerline options from the associated wind farms as follows:

- Powerline option 1 is up to 5km in length to the Hendrina North WEF Option 1 substation on Portion 1 of the Farm Dunbar 189IS;

- Powerline option 2 is up to 5km in length to the Hendrina North WEF substation Option 2 on Portion 3 of the Farm Hartebeestkuil 185IS;
- Powerline option 3 is up to 7km in length to the Hendrina South WEF substation on Portion 3 of the Farm Dunbar 189IS.

3.2.2 No-Go Alternative

The 'no-go' alternative is the option of not developing the proposed project. This alternative would not result in any environmental impacts on the sites or within the assessment corridors or in the surrounding local area and the status quo would remain. This scenario provides the baseline against which other alternatives are compared and will be considered throughout the report.

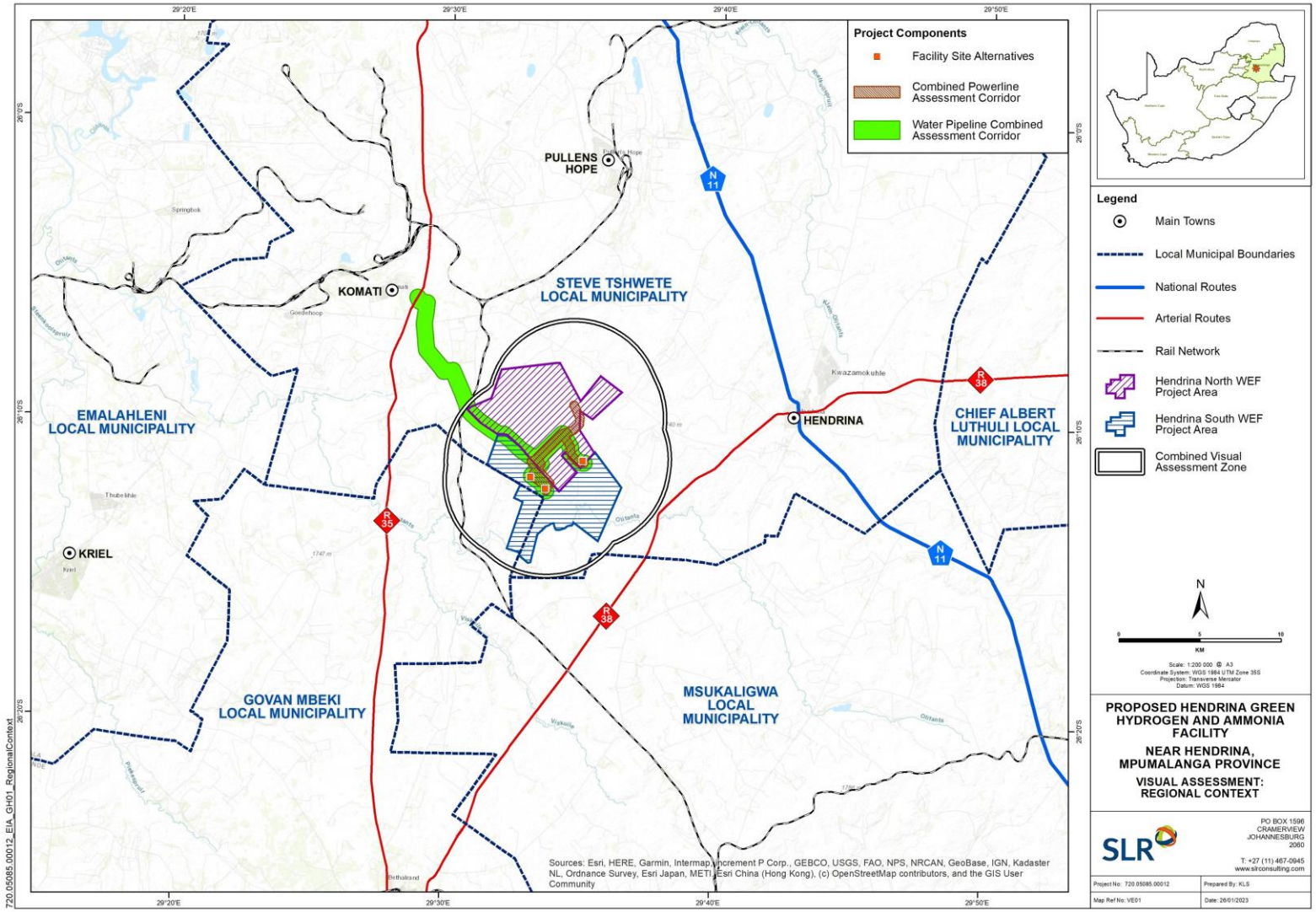

Figure 1: Proposed Facility in the Regional Context

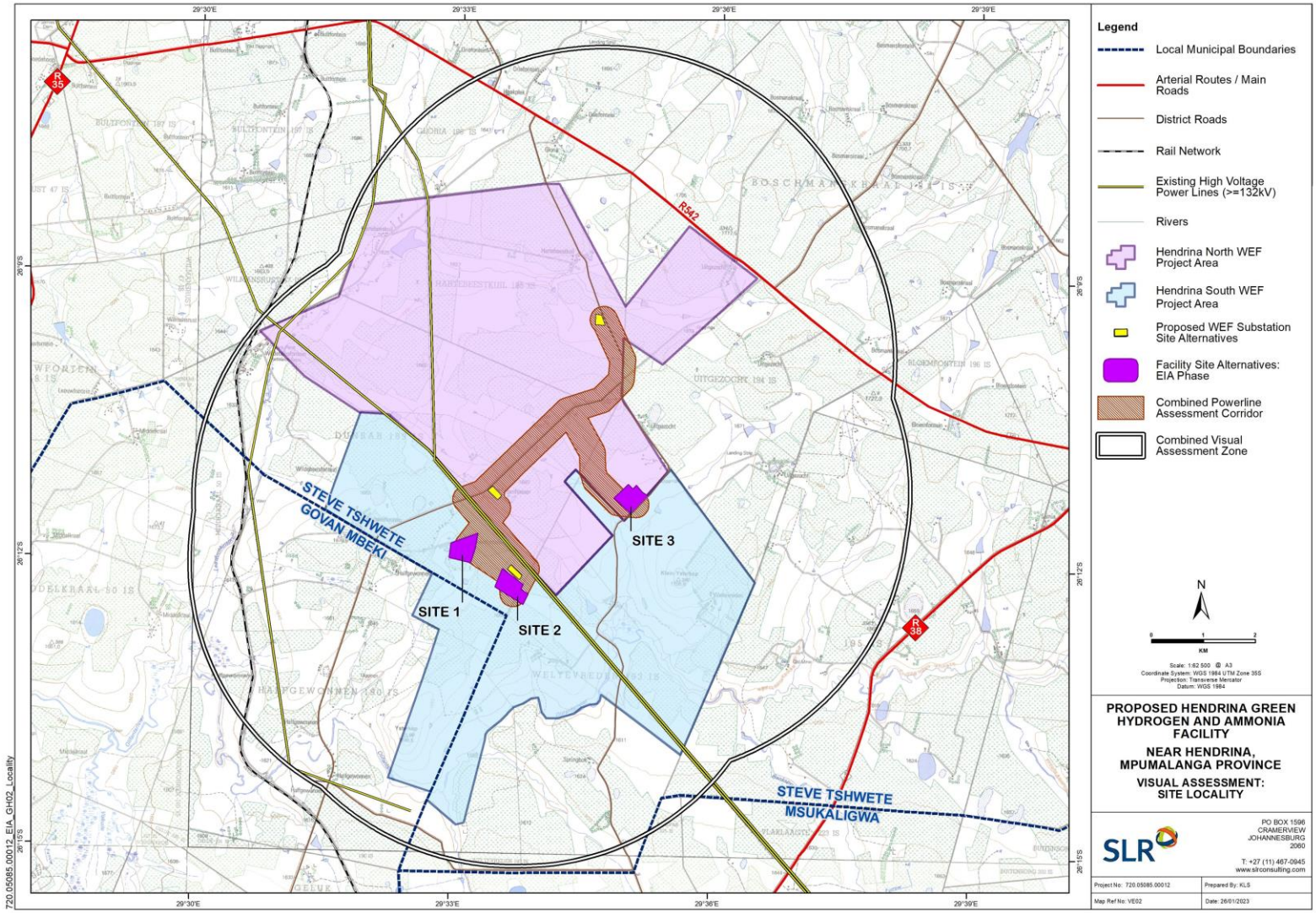

Figure 2: Project Locality

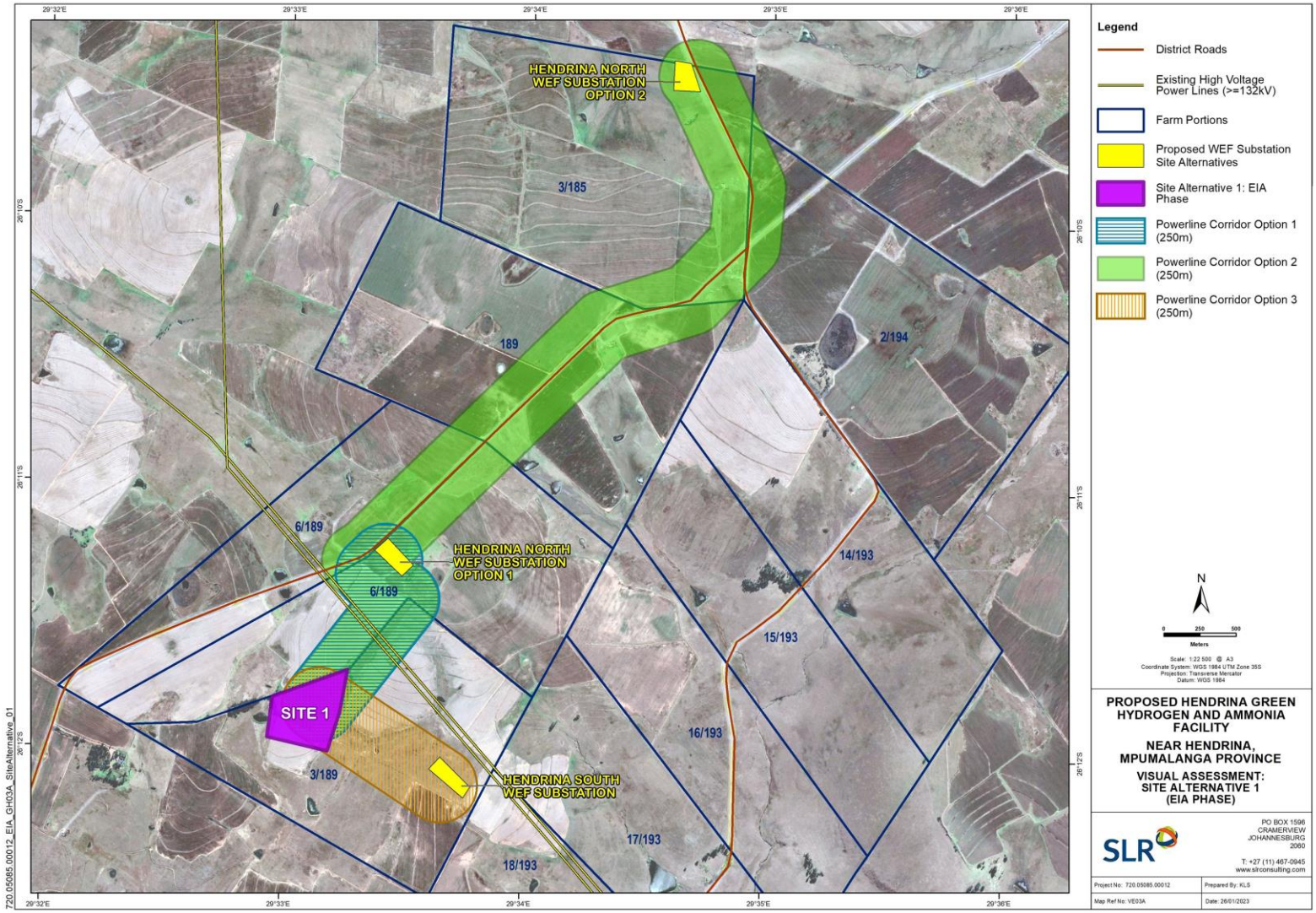

Figure 3: Alternative 1

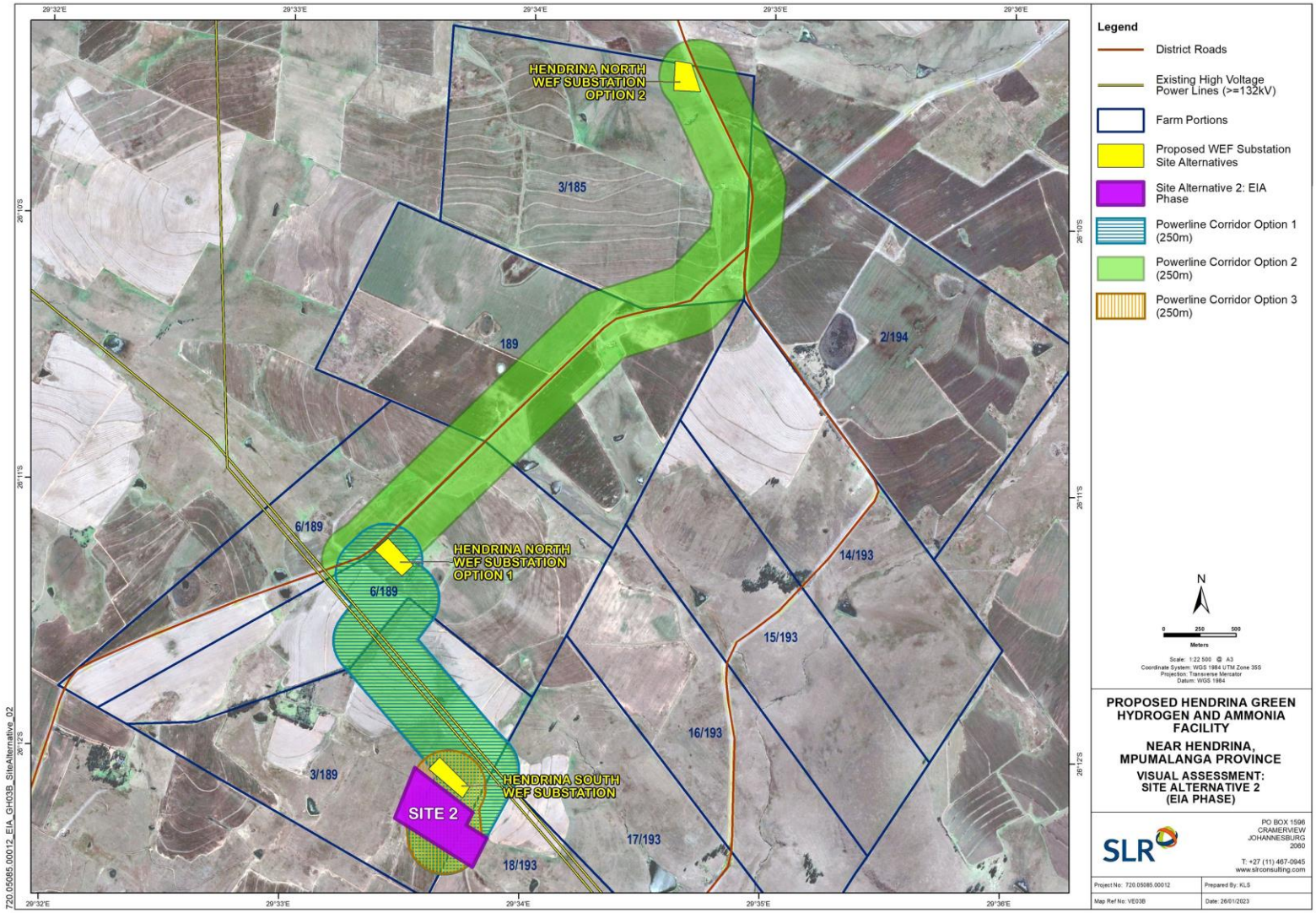

Figure 4: Alternative 2

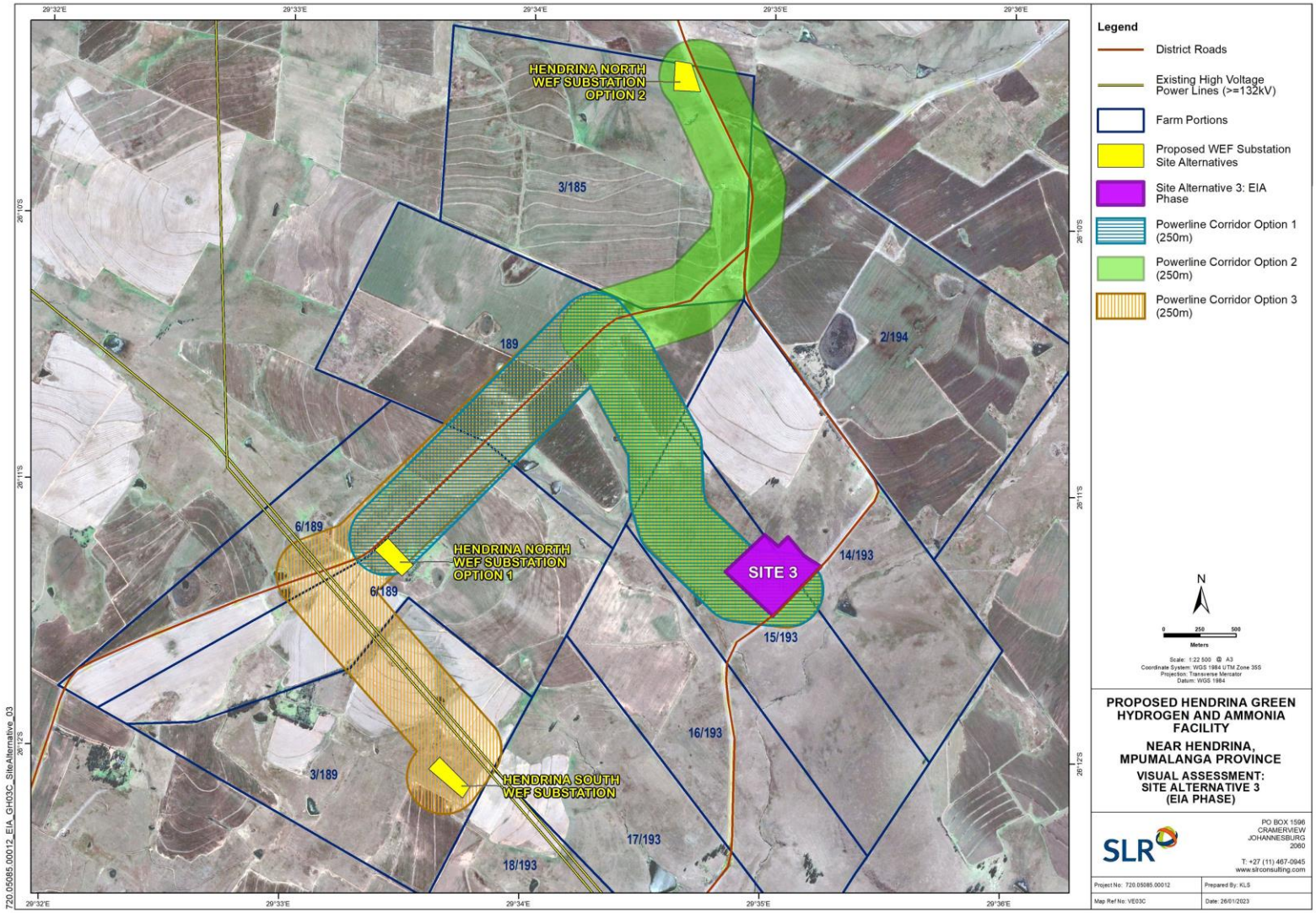

Figure 5: Alternative 3

4. LEGAL REQUIREMENTS AND GUIDELINES

Key legal requirements pertaining to the proposed development are outlined below.

In terms of the National Environmental Management Act, 1998 (Act No. 107 of 1998), (NEMA) and the EIA Regulations 2014 (as amended), the proposed development includes listed activities which require a full Environmental Impact Assessment (EIA) to be undertaken. As part of the EIA process, the need for a VIA to be undertaken has been identified in order to assess the visual impact of the proposed Facility.

There is currently no legislation within South Africa that explicitly pertains to the assessment of visual impacts, however in addition to NEMA the following legislation has relevance to the protection of scenic resources:

- National Environmental Management: Protected Areas Act, 2003 (Act No. 57 of 2003)
- National Heritage Resources Act, 1999 (Act No. 25 of 1999)

Based on these Acts protected or conservation areas and sites or routes with cultural or symbolic value have been taken into consideration when identifying sensitive and potentially sensitive receptor locations and rating the sensitivity of the study area.

Accordingly, this specialist visual assessment has been undertaken in compliance with Appendix 6 of 2014 NEMA EIA Regulations (as amended).

5. FACTORS INFLUENCING VISUAL IMPACT

The degree of visibility of an object informs the level and intensity of the visual impact, but other factors also influence the nature of the visual impact. The landscape and aesthetic context of the environment in which the object is placed, as well as the perception of the viewer are also important factors.

5.1 VISUAL ENVIRONMENT

Green hydrogen production facilities and associated OHLs are not features of the natural environment but are rather a representation of human (anthropogenic) alteration. As such, these developments are likely to be perceived as visually intrusive when placed in largely undeveloped landscapes that have a natural scenic quality and where tourism activities are practised that are dependent on the enjoyment of, or exposure to, the scenic or aesthetic character of the area. Residents and visitors to these areas could perceive this type of development to be highly incongruous in this context and may regard the development as an unwelcome intrusion which degrades the natural character and scenic beauty of the area, and which could potentially even compromise the practising of tourism activities in the area. In this instance however, the area is not typically valued for its tourism significance and no formal protected areas were identified in the broader area. In addition, very few, leisure-based tourism activities, and no recognised tourism routes were identified in the study area.

The presence of other anthropogenic features associated with the built environment may not only obstruct views but also influence the perception of whether a development is a visual impact. In industrial areas for

example, where other infrastructure and built form already exists, the visual environment could be 'degraded' and thus the introduction of a green hydrogen and ammonia production facility into this setting may be considered to be less visually intrusive than if there was no existing built infrastructure visible.

5.2 SUBJECTIVE EXPERIENCE OF THE VIEWER

The perception of the viewer/ receptor toward an impact is highly subjective and involves 'value judgements' on behalf of the receptor. The viewer's perception is usually dependent on the age, gender, activity preferences, time spent within the landscape and traditions of the viewer (Barthwal, 2002). Thus, certain receptors may not consider this facility to be a negative visual impact as this type of development is often associated with employment creation, social upliftment and the general growth and progression of an area and could even have positive connotations.

5.3 TYPE OF VISUAL RECEPTOR

Visual impacts can be experienced by different types of receptors, including people living or working, or driving along roads within the viewshed of the proposed development. The receptor type in turn affects the nature of the typical 'view', with views being permanent in the case of a residence or other place of human habitation, or transient in the case of vehicles moving along a road. The nature of the view experienced affects the intensity of the visual impact experienced.

It is important to note that visual impacts are only experienced when there are receptors present to experience this impact. Thus, where there are no human receptors or viewers present, there are not likely to be any visual impacts experienced.

5.4 VIEWING DISTANCE

Viewing distance is a critical factor in the experiencing of visual impacts, as beyond a certain distance, even large developments tend to be much less visible, and difficult to differentiate from the surrounding landscape. The visibility of an object is likely to decrease exponentially as one moves away from the source of impact, with the impact at 1 000m being considerably less than the impact at a distance of 500m (**Figure 6**).

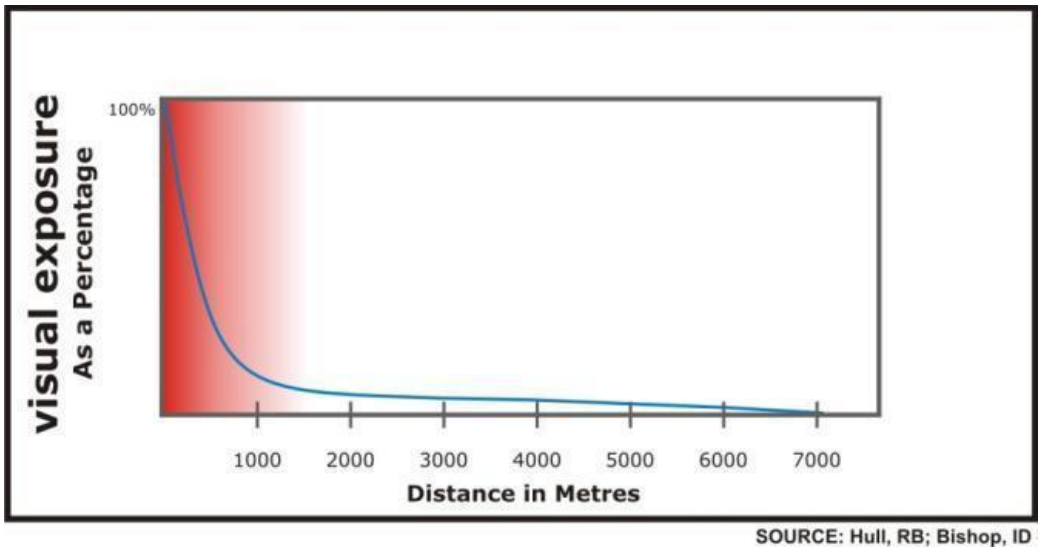

Figure 6: Conceptual representation of diminishing visual exposure over distance

6. VISUAL CHARACTER AND SENSITIVITY OF THE STUDY AREA

Defining the visual character of an area is an important part of assessing visual impacts as this establishes the visual baseline or existing visual environment in which the development would be constructed. The visual impact of a development is measured by establishing the degree to which the development would contrast with, or conform to, the visual character of the surrounding area. The inherent sensitivity of the area to visual impacts or visual sensitivity is thereafter determined, based on the visual character, the economic importance of the scenic quality of the area, inherent cultural value of the area and the presence of visual receptors.

Physical and land use related characteristics, as outlined below, are important factors contributing to the visual character of an area.

6.1 PHYSICAL AND LAND USE CHARACTERISTICS

6.1.1 Topography

The proposed Project is located in an area largely characterised by a mix of flat to undulating plains (**Figure** 7) and greater relief in the form of slightly higher-lying plateaus intersected by river valleys. Mining activity in parts of the study area has altered the natural topography significantly with mine dumps forming prominent features in the landscape. Slopes across the study area are relatively gentle to moderate, with steeper slopes being largely associated with the more incised river valleys. The main water course in the study area is the Olifants River which traverses the study area in a west-east direction.

Maps showing the topography and slopes within the study area are provided in **Figure 8** and **Figure 9**.

Figure 7: View south from the R542 Main Road across the combined study area showing flat to gently undulating terrain.

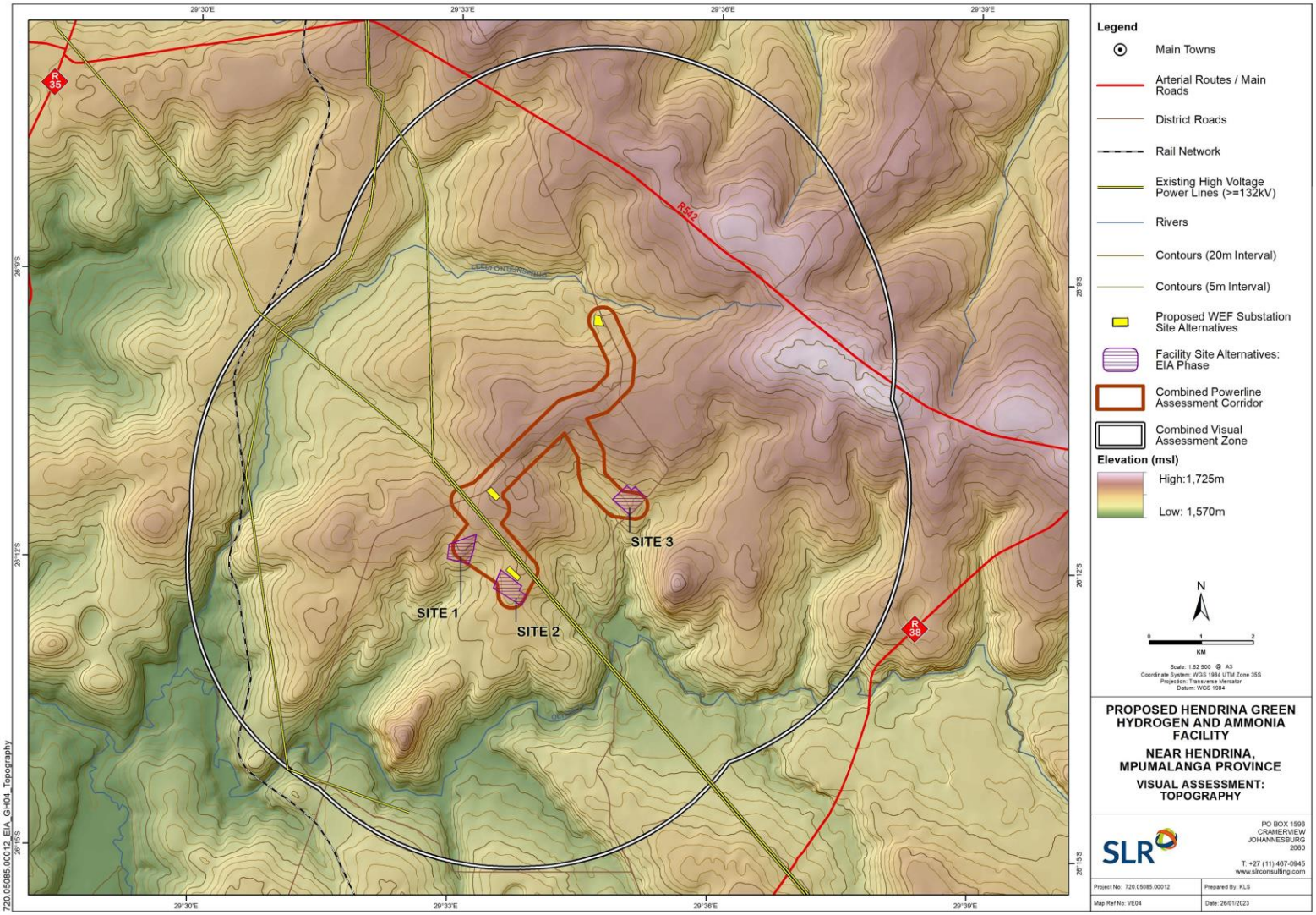

Figure 8: Topography of the study area

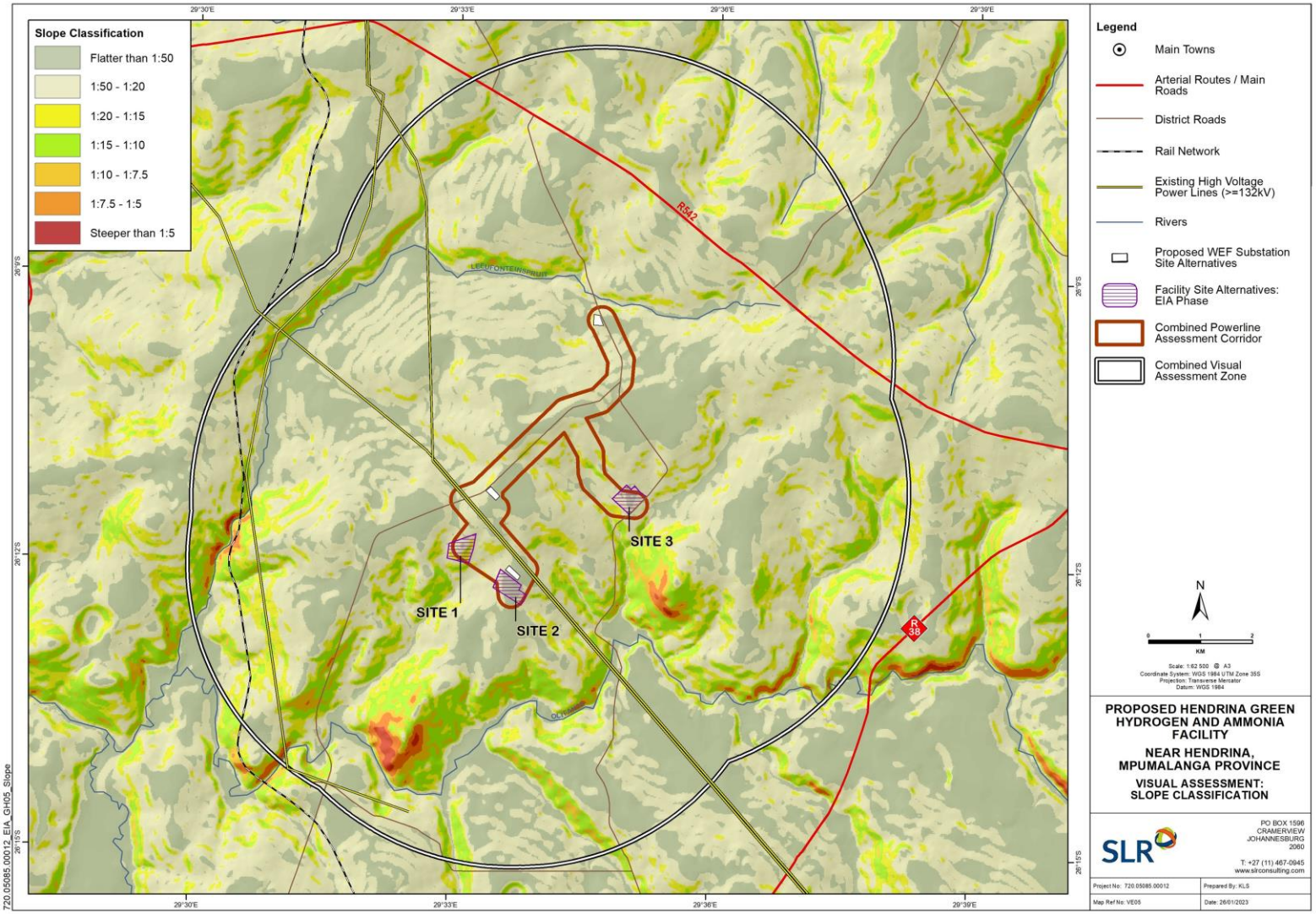

Figure 9: Slope classification across the study area

Visual Implications

The nature of the topography and the position of the viewer within the landscape are strong factors influencing the types of vistas typically present. Wider vistas will typically be experienced from higher-lying areas or hilltops and as such the viewshed will be directly dependent on whether the viewer is within a valley bottom or in an area of higher elevation. Importantly in the context of this study, the same is true of objects placed at different elevations and within different landscape settings. Objects placed on high-elevation slopes or ridge tops would be highly visible, while those placed in valleys or enclosed plateaus would be far less visible.

Elements of the Facility and the OHLs are relatively large and could potentially be visible from a considerable distance. Although localised topographic variations may limit views of these structures from some (limited) parts of the study area, across the remainder of the study area there would be very little topographic shielding to lessen the visual impact from any locally-occurring receptor locations.

GIS technology was used to undertake a preliminary visibility analysis for the proposed Facility based on the project information provided by ENERTRAG SA. The analysis was based on a worst-case scenario where the assumed height of the tallest structure is 40m. The combined viewshed for all three site alternatives is shown in **Figure 10**. Although this analysis shows that significant portions of the study area are outside the combined viewshed for the Facility, it is also evident that tall structures on all three site alternatives would be visible from many parts of the study area.

At a maximum height of 35m, elements of the OHL infrastructure are expected to be visible from many of the locally-occurring receptor locations. In addition, sections of the proposed powerline could impact on the skyline, particularly where they traverse ridges or areas of relatively higher elevation. A preliminary visibility analysis was undertaken for the proposed powerline routes, based on points at 250 m intervals along the centre line of the combined assessment corridor, and assuming a tower height of 35 m. The resulting viewshed as per **Figure 11** indicate that elements of the OHL infrastructure would be visible from much of the study area.

It should be noted that this visibility analysis is based entirely on topography and does not consider any existing vegetation cover or built infrastructure which may screen views of the proposed development. Detailed topographic data was not available for the broader study area and as such the visibility analysis does not take into account any localised topographic variations which may constrain views. This analysis should therefore be seen as a conceptual representation or a worst-case scenario.

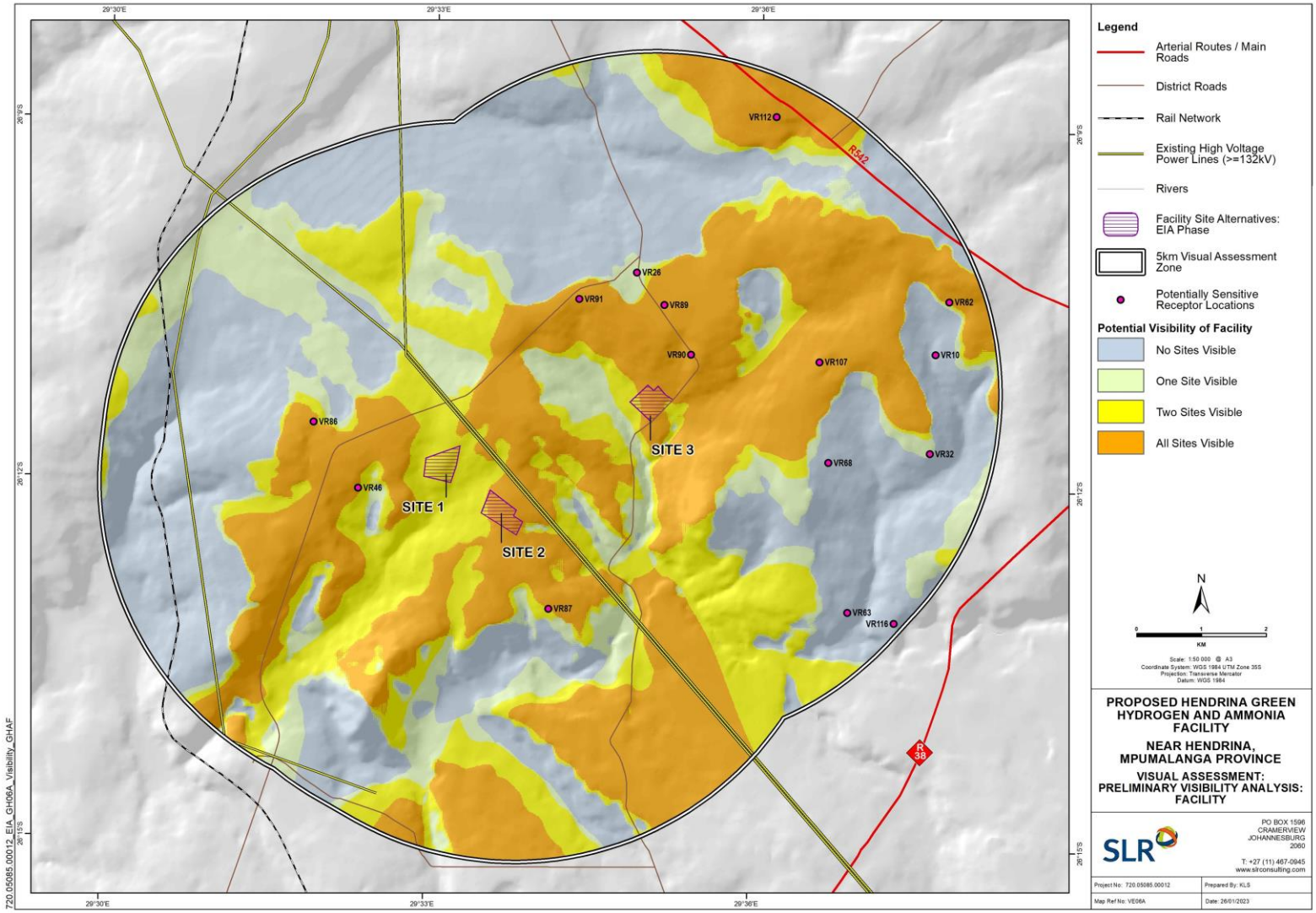

Figure 10: Potential visibility of the proposed Facility

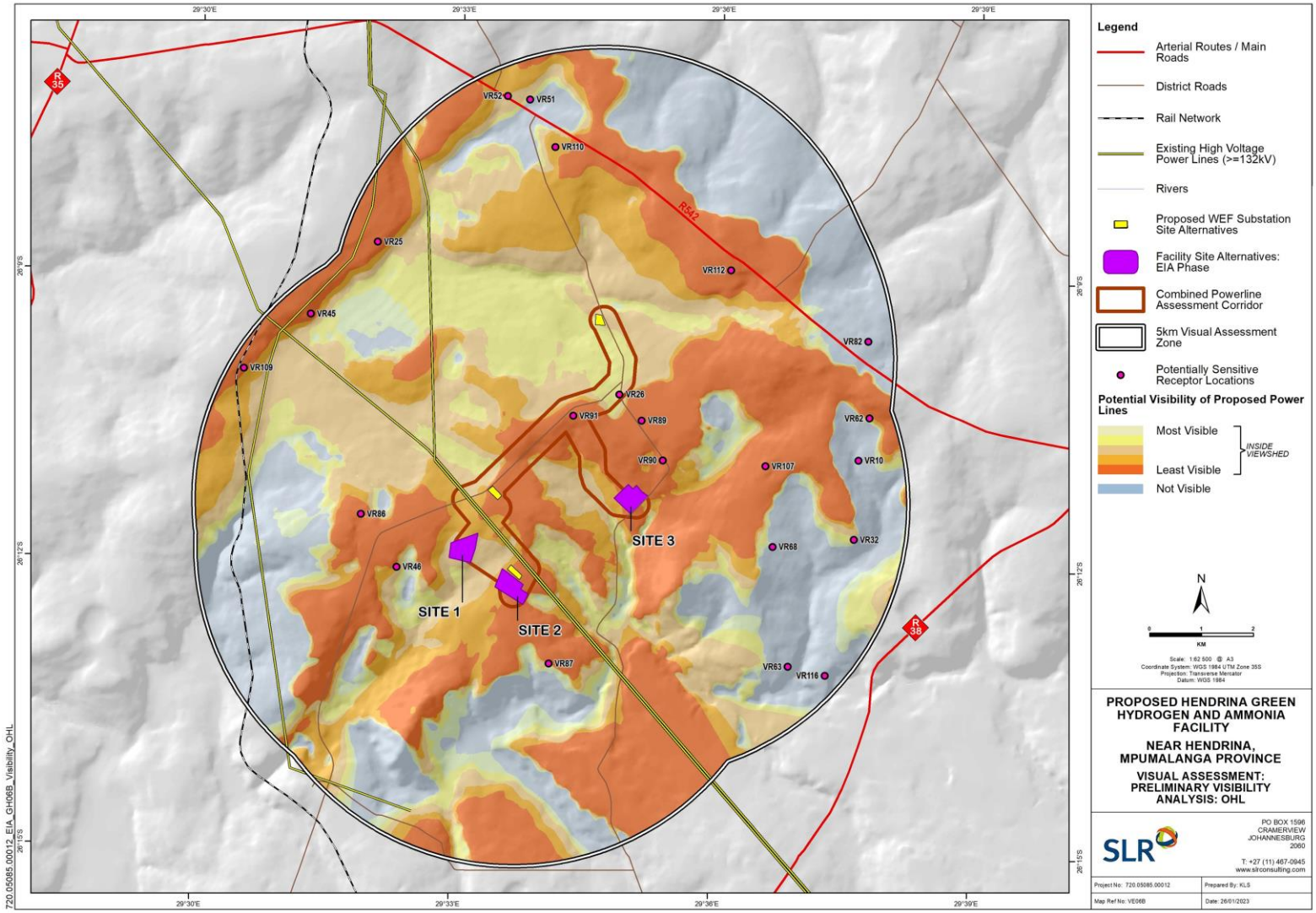

Figure 11: Potential visibility of OHL

6.1.2 Vegetation

According to Mucina and Rutherford (2006), the study area is largely dominated by the Eastern Highveld Grassland vegetation type (**Figure 12**) which is characterised by short dense grassland (**Figure 13**) with scattered rocky outcrops where some woody species occur.

Much of the natural vegetation cover has however been partly removed or transformed by cultivation. In addition, there are clusters of tall exotic trees scattered across the study area and around farmsteads (**Figure 14**).

Visual Implications

Although the proposed development will contrast significantly with the predominant vegetative cover in the area, scattered trees and shrubs will provide some degree of screening thus potentially reducing impacts experienced by the potentially sensitive receptors in the area. In addition, tall trees planted around farmhouses and along roads in the area are expected to restrict views from these receptor locations.

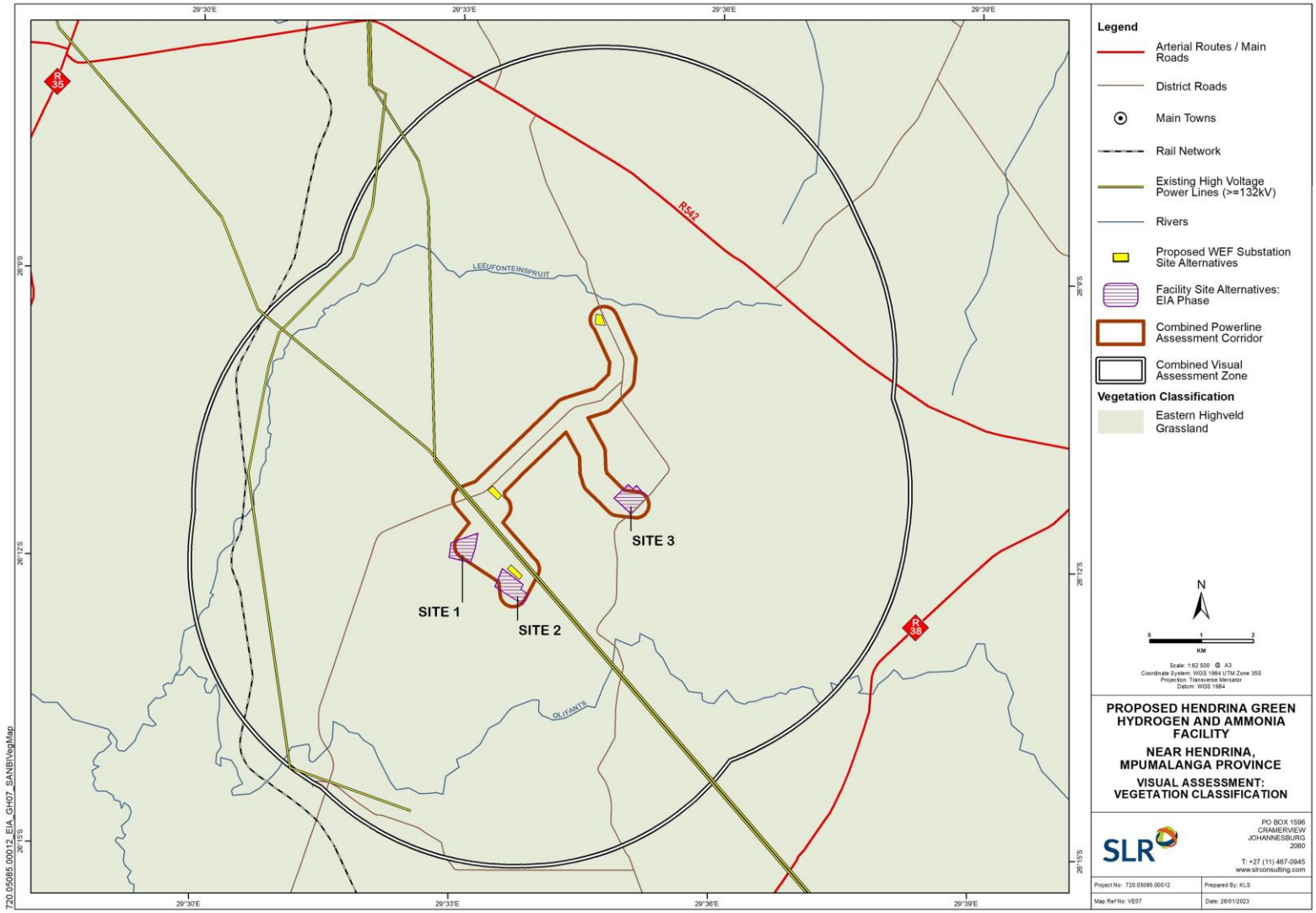

Figure 12: Vegetation Classification in the Study Area

Figure 13: Short scrubby grasslands in the southern sector of the study area.

Figure 14: Clusters of tall trees scattered across the study area.

6.1.3 Land Use

According to the South African National Land Cover dataset (Geoterraimage 2020), much of the visual assessment area is classified as “Cultivated Land” interspersed with significant areas of “Grassland”. Small tracts of forested land and numerous water bodies are scattered throughout the study area (**Figure 15**).

Commercial agriculture is the dominant activity in the study area, with the main focus being maize cultivation (**Figure 16**) and livestock grazing. There are multiple farm portions in the study area, resulting in a relatively moderate density of rural settlement with many scattered farmsteads in evidence. Built form in much of the study area comprises farmsteads, ancillary farm buildings and workers’ dwellings, gravel access roads, telephone lines, fences and windmills (**Figure 17**).

High levels of human influence are however visible in the south-western sector of the study area, where coal mining activities, along with some very prominent spoil heaps occur (**Figure 18**).

Other evidence of significant human influence includes road, rail, telecommunications, and high voltage electricity infrastructure (**Figure 19**).

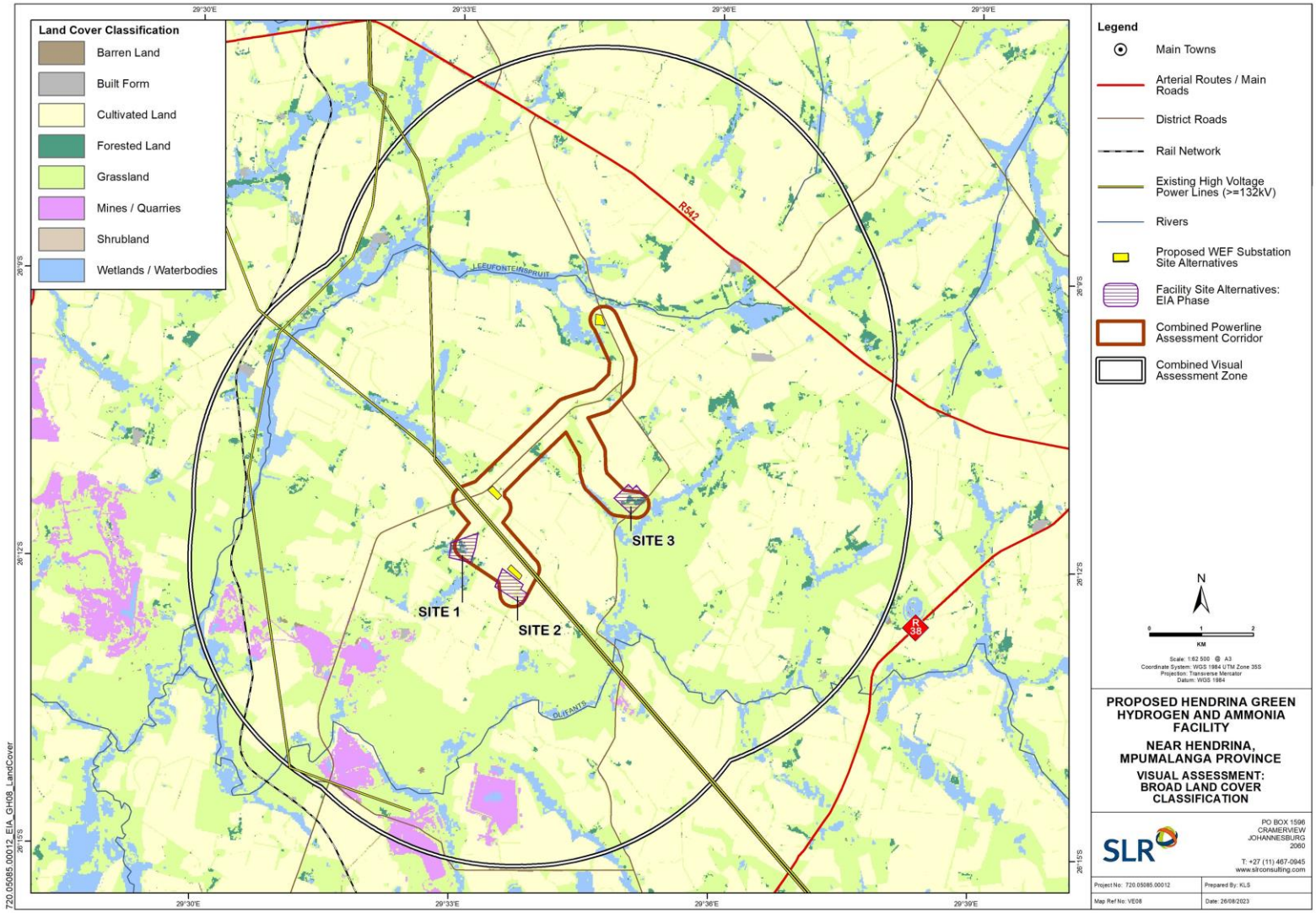

Figure 15: Land Cover Classification

Figure 16: Areas of maize cultivation in the southern sector of the combined study area.

Figure 17: Typical farm infrastructure in the study area.

Figure 18: View of Overlooked Colliery in the southern sector of the combined study area.

Figure 19: High voltage power lines in the southern sector of the combined study area (Mine infrastructure and dump in background).

Visual Implications

The presence of cultivated land in conjunction with the remaining natural grassland cover across much of the study area would give the viewer the general impression of a largely rural / pastoral setting. Thus, the proposed Project would alter the visual character and contrast significantly with the typical land use and/or pattern and form of human elements present across much of the study area.

However, high levels of human transformation and visual degradation are evident in the south-west where mining activity dominates the landscape. In addition, roads, railways and powerlines have further degraded the visual character of the study area to some degree. This transformation has already altered the visual

character across much of the south-western sector of the study area, thus reducing the level of contrast of the proposed development.

The influence of the level of human transformation on the visual character of the area is described in more detail below.

6.2 VISUAL CHARACTER AND CULTURAL VALUE

The physical and land use-related characteristics of the study area as described above contribute to its overall visual character. Visual character largely depends on the level of change or transformation from a natural baseline in which there is little evidence of human transformation of the landscape. Varying degrees of human transformation of a landscape would engender differing visual characteristics to that landscape, with a highly modified urban or industrial landscape being at the opposite end of the scale to a largely natural undisturbed landscape. Visual character is also influenced by the presence of built infrastructure including buildings, roads, and other objects such as telephone or electrical infrastructure. The visual character of an area largely determines the **sense of place** relevant to the area. This is the unique quality or character of a place, whether natural, rural, or urban which results in a uniqueness, distinctiveness, or strong identity.

The predominant land use in the area (maize cultivation) has significantly transformed the natural landscape across much of the study area. In addition, electricity infrastructure and mining activity, particularly in the south-western areas, have resulted in a high degree of visual degradation. The more industrial character of the landscape is an important factor in this context, as the introduction of the proposed elements of the Project would result in less visual contrast where other anthropogenic elements are already present, especially where the scale of those elements is similar to that of the proposed Project.

The scenic quality of the landscape is also an important factor that contributes to the visual character or inherent sense of place. Visual appeal is often associated with unique natural features or distinct variations in form. As such, the pastoral landscape and rolling hills in parts of the study area are important features that could increase the visual appeal and visual interest in the area.

Cultural landscapes are becoming increasingly important concepts in terms of the preservation and management of rural and urban settings across the world. The concept of ‘cultural landscape’ is a way of looking at a place that focuses on the relationship between human activity and the biophysical environment (Breedlove, 2002). In this instance, the rural / pastoral landscape represents how the environment has shaped the predominant land use and economic activity practiced in the area, as well as the patterns of human habitation and interaction. The presence of small towns, such as Hendrina, engulfed by an otherwise rural / pastoral environment, form an integral part of the wider landscape.

In light of this, it is important to assess whether the introduction of the development as proposed into the study area would be a degrading factor in the context of the prevailing character of the cultural landscape. Broadly speaking, visual impacts on the cultural landscape in the area around the proposed Project would be reduced by the fact that the visual character in much of the area has been significantly transformed and degraded by mining and infrastructural development.

6.3 VISUAL SENSITIVITY ANALYSIS AND VERIFICATION

Visual sensitivity can be defined as the inherent sensitivity of an area to potential visual impacts associated with a proposed development. It is based on the physical characteristics of the area (i.e., topography, landform, and land cover), the spatial distribution of potential receptors, and the likely value judgements of these receptors towards a new development (Oberholzer: 2005). A viewer's perception is usually based on the perceived aesthetic appeal of an area and on the presence of economic activities (such as recreational or nature-based tourism) which may be based on this aesthetic appeal.

In order to assess the visual sensitivity of the area, a matrix has been developed based on the characteristics of the receiving environment which, according to the Guidelines for Involving Visual and Aesthetic Specialists in the EIA Processes, indicate that visibility and aesthetics are likely to be 'key issues' (Oberholzer: 2005).

Based on the criteria in the matrix (**Table 2**), the visual sensitivity of the area is classified according to the categories described below:

i. High - The introduction of a new development such as a green hydrogen and ammonia facility would be likely to be perceived negatively by receptors in this area; it would be considered to be a visual intrusion and may elicit opposition from these receptors.
ii. Moderate – Receptors are present, but due to the nature of the existing visual character of the area and likely value judgements of receptors, there would be limited negative perception towards the new development as a source of visual impact.
iii. Low - The introduction of a new development would not be perceived to be negative, there would be little opposition or negative perception towards it.

The table below outlines the factors used to rate the visual sensitivity of the study area. The ratings are specific to the visual context of the receiving environment within the study area.

Table 2: Environmental factors used to define visual sensitivity of the study area

FACTORS	DESCRIPTION	RATING									
		1	2	3	4	5	6	7	8	9	10
Pristine / natural / scenic character of the environment	Study area is partially natural with areas of scenic value and some pastoral elements.										
Presence of sensitive visual receptors	No sensitive receptors have been identified in the study area, although *potentially* sensitive receptors are present.										
Aesthetic sense of place / visual character	Visual character is a typical rural / pastoral landscape, although significantly transformed by mining activity.										
Irreplaceability / uniqueness / scarcity value	Few areas of scenic value were found within the study area.										
Cultural or symbolic meaning	Much of the area is a typical rural / pastoral landscape.										
Protected / conservation areas in the study area	No protected or conservation areas were identified in the study area.										
Sites of special interest present in the study area	No sites of special interest were identified in the study area.										
Economic dependency on scenic quality	No tourism/leisure-based facilities were found in the area										
International / regional / local status of the environment	Study area is typical of rural / pastoral landscapes, although significantly transformed by mining activity										
**Scenic quality under threat / at risk of change	Introduction of the Project as proposed will alter the visual character and sense of place, giving rise to significant cumulative impacts										

**Any rating above '5' for this specific aspect will trigger the need to undertake an assessment of cumulative visual impacts.

Low			Moderate					High	
10	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**

Based on the above factors, the total score for the study area is 30, which according to the scale above, would result in the area being rated as having a low visual sensitivity. It should be stressed however that the concept of visual sensitivity has been utilised indicatively to provide a broad-scale indication of whether the landscape is likely to be sensitive to visual impacts and is based on the physical characteristics of the study area, economic activities and land use that predominates. An important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs and this has been factored into the sensitivity rating above. The presence of visual receptors is examined in more detail in **Section 0** of this report. However, no formal protected areas, leisure-based tourism activities or sensitive receptor locations were identified in the study area.

During the initial stages of the EIA, a site sensitivity assessment was undertaken to assess the relative sensitivities of each site alternative and OHL corridor alternative . The aim of this exercise was to indicate any areas which should be precluded from the development footprint. From a visual perspective, sensitive areas would be areas where the establishment of a green hydrogen and ammonia production facility and associated OHL infrastructure would result in the greatest probability of visual impacts on potentially sensitive visual receptors.

6.3.1 Sensitivity: Facility

Using GIS-based visibility analysis, it was possible to determine areas that would be visible to the highest numbers of receptors in the study area. However, this analysis found that none of the site alternatives are significantly more visible than the others. As such, in terms of visibility, no areas were found to be more sensitive than others.

In addition, investigation determined that there are no sensitive or potentially sensitive receptors within 500 m of any of the site alternatives that would be affected by the development and as such, no areas of visual sensitivity were identified in relation to any of the site alternatives.

6.3.2 Sensitivity: OHL Routes

Using GIS-based visibility analysis, it was possible to determine which sectors of the combined assessment corridor would be visible to the highest numbers of receptors in the study area. This analysis confirmed that areas of higher elevation are visible to greater numbers of potentially sensitive receptors. Hence the visual prominence of a tall structure such as a powerline tower would be exacerbated if located on any ridges or a relatively higher-lying plateaus. It is noted that the proposed OHL route alignment traverses some ridges and areas of relatively higher elevation that could be seen as areas of potentially high visual sensitivity. **However, the presence of existing powerlines and road infrastructure as well as the fact that the study area as a whole is rated as having a low visual sensitivity would reduce the sensitivity rating of the ridges to "Medium".**

In considering the possible visual impact of the OHL on any nearby farmsteads or receptors, investigation determined that, although there are two farmsteads located within the combined assessment corridor, both of these farmsteads are located in the project area for Hendrina North WEF. As such, the respective

land owners are not expected to perceive the OHL in a negative light and this factor would reduce the visual impacts experienced.

Accordingly, no areas of visual sensitivity were identified in relation to any of the corridor alternatives.

6.3.3 Sensitivities identified by the National Screening Tool

In assessing visual sensitivity, the proposed development was examined in relation to the Landscape Theme of the National Environmental Screening Tool to determine the relative landscape sensitivity for this type of development. The National Environmental Screening Tool does not identify any landscape sensitivities in respect of the proposed GHAF or the grid connection infrastructure.

6.4 VISUAL ABSORPTION CAPACITY

Visual absorption capacity is the ability of the landscape to absorb a new development without any significant change in the visual character and quality of the landscape. The level of absorption capacity is largely based on the physical characteristics of the landscape (topography and vegetation cover) and the level of transformation present in the landscape.

Although the flat to undulating topography in the study area and the areas of cultivation and grassland would reduce the visual absorption capacity, this would be offset to some considerable degree by the presence of mining and infrastructural development in the combined study area.

Visual absorption capacity in the study area is therefore rated as **moderate**.

7. TYPICAL VISUAL IMPACTS ASSOCIATED WITH INDUSTRIAL FACILITES

In this section, the typical visual issues related to the establishment of a GHAF and associated OHL. It is important to note that this type of development is still relatively new in South Africa and as such this section of the report can only make assumptions as to the likely generic impacts associated with the proposed development.

7.1 FACILITY

The Facility is likely to be quite large and relatively industrial in character. Some elements of the Facility, such as the Air Separation Unit, include relatively tall structures which are expected to be highly visible from the surrounding area. As the Facility is not a feature of the natural environment, but is representative of human (anthropogenic) alteration, it will be perceived to be incongruous when placed in a largely natural landscape. Conversely, the presence of other anthropogenic objects associated with the built environment, especially other industrial-type developments, may result in the visual environment being considered to be ‘degraded’. Thus the introduction of a Facility as proposed into this setting may be less of a visual impact than if there was no existing built infrastructure visible. In this instance, the Facility is related to the Hendrina North and Hendrina South WEF projects and will be located within in the project area for one of these WEFS. As such, the Facility is likely to be perceived as part of the greater Hendrina Renewable Energy Complex. Thus, the visual impact of the Facility will be relatively minor when compared to the visual impact associated with the WEF development as a whole.

Other potential impacts may result from surface clearance on the site, resulting in the increased visual prominence of the Facility and increasing the level of contrast with the surrounding landscape. In addition, security lighting on the site may impact on the nightscape (**Section 8.3**).

7.2 OHL

Powerline towers are by their nature very large objects and thus highly visible. It is understood that the maximum tower height envisaged for the proposed OHL is expected to be 35m (approximately equivalent in height to a ten-storey building). Although a tower structure would be less visible than a building, the height of the structure means that the tower would still typically be visible from a considerable distance. Visibility would be increased by the fact that the OHL comprises a series of towers typically spaced approximately 200m to 400m apart in a linear alignment.

As powerlines are not features of the natural environment, they could be perceived to be highly incongruous in the context of a largely natural landscape. The height and linear nature of the powerline will exacerbate this incongruity, as the towers may impinge on views within the landscape. In addition, the practice of clearing taller vegetation from areas within the OHL servitude can increase the visibility and incongruity of the OHL. In a largely natural, bushy setting, vegetation clearance will cause fragmentation of the natural vegetation cover, thus making the OHL more visible and drawing the viewer's attention to the servitude.

In this instance, the OHL is intended to serve the proposed Facility and as such, will only be built if this project goes ahead. In addition, the OHL project will be entirely located within the project areas for the Hendrina North and Hendrina South WEFS. As such, the facility is likely to be perceived as part of the greater Hendrina Renewable Energy Complex and the visual impact will be relatively minor when compared to the visual impact associated with the development as a whole.

7.3 ASSOCIATED SITE INFRASTRUCTURE

Other infrastructure components of this project include:

- Electrical infrastructure required for power supply to the facility.
- Temporary and permanent laydown areas required for temporary storage and assembly of components and materials.
- Access road/s to the site and internal roads between project components, with a width of up to up to 6m wide respectively.
- Fencing and lighting.
- Lightning protection.
- Telecommunication infrastructure.
- Stormwater channels.
- Water pipelines
- Offices.
- Operational control centre.
- Operation and Maintenance Area / Warehouse / workshop.
- Ablution facilities.

- A gate house.
- Control centre, offices, warehouses.
- Security building.

The visual impact of the other infrastructure associated with the facility is generally not regarded as a significant factor when compared to the visual impact associated with the Facility as a whole. Aside from the proposed water pipelines, all the infrastructural elements of the project will be located within the Facility site. As such, the infrastructure would be perceived as part of the Facility development and the visual impact will be relatively minor when compared to the visual impact associated with the development as a whole. The infrastructure will however increase the visual "clutter" on the site and magnify the visual prominence of the Facility if located on ridge tops or flat sites in natural settings where there is limited tall wooded vegetation to conceal the impact.

The proposed water pipeline however, extends north-west from the Facility to Komati Power Station. It is understood that much of this pipeline will be buried, with only portions above ground. Much of the pipeline route alignment follows that of existing high voltage powerlines and also the proposed 132kV powerline route alignments for the Hendrina North and South Grid Connection projects. Hence the visual impact associated with the pipeline will be relatively minor when compared to the visual impact associated with the nearby grid connection infrastructure. It should be noted that these grid connection proposals were assessed in the combined VIA undertaken by SiVEST SA (Pty) Ltd) in respect of the Hendrina Renewable Energy Complex in April 2022 and no fatal flaws were identified for any of the proposed grid connection alternatives.

8. SENSITIVE VISUAL RECEPTORS

A sensitive visual receptor location is defined as a location where receptors would potentially be impacted by a proposed development. Adverse impacts often arise where a new development is seen as an intrusion which alters the visual character of the area and affects the 'sense of place'. The degree of visual impact experienced will however vary from one receptor to another, as it is largely based on the viewer's perception.

A distinction must be made between a receptor location and a *sensitive* receptor location. A receptor location is a site from where the proposed development may be visible, but the receptor may not necessarily be adversely affected by any visual intrusion associated with the development. Less sensitive receptor locations include locations of commercial activities and certain movement corridors, such as roads that are not tourism routes. More sensitive receptor locations typically include sites that are likely to be adversely affected by the visual intrusion of the proposed development. They include tourism facilities, scenic sites and residential dwellings in natural settings.

The identification of sensitive receptors is typically based on a number of factors which include:

- the visual character of the area, especially taking into account visually scenic areas and areas of visual sensitivity;
- the presence of leisure-based (especially nature-based) tourism in an area;
- the presence of sites or routes that are valued for their scenic quality and sense of place;

- the presence of homesteads / farmsteads in a largely natural setting where the development may influence the typical character of their views; and
- feedback from interested and affected parties, as raised during the public participation process conducted as part of the EIA study.

As the visibility of the development would diminish exponentially over distance (**Figure 6**), receptor locations which are closer to the Facility or OHL would experience greater adverse visual impacts than those located further away.

The degree of visual impact experienced will however vary from one inhabitant to another, as it is largely based on the viewer's perception. Factors influencing the degree of visual impact experienced by the viewer include the following:

- Value placed by the viewer on the natural scenic characteristics of the area.
- The viewer's sentiments toward the proposed structures. These may be positive (a symbol of progression toward a less polluted future) or negative (foreign objects degrading the natural landscape).
- Degree to which the viewer will accept a change in the typical character of the surrounding area.

8.1 RECEPTOR IDENTIFICATION

Preliminary desktop assessment did not identify any formal protected areas or leisure-based tourism activities in the study area. The desktop assessment did however identify multiple farmsteads and residences within the study area. While these homesteads and residences could be seen as receptors, not all of them would be sensitive to the proposed development and given the number of farmsteads, it was not possible to confirm the presence of receptors at all the identified locations. Notwithstanding these limitations, all the identified receptor locations were assessed as part of the VIA as they are still regarded as being potentially sensitive to the visual impacts associated with the proposed development. ***None of these receptor locations was found to be sensitive.***

Although the receptor locations are all believed to be farmsteads, they are regarded as *potentially sensitive* visual receptors as the proposed development could potentially alter natural or semi-natural vistas experienced from these locations. At this stage however, little information has been received regarding local sentiments towards the proposed development.

In many cases, roads along which people travel, are regarded as sensitive receptors. The primary thoroughfare in the study area is the R542 main road. This road and the other thoroughfares in the study area are primarily used as local access roads and do not form part of any scenic tourist routes. These roads are not specifically valued or utilised for their scenic or tourism potential and are therefore not regarded as visually sensitive.

The identified potentially sensitive visual receptor locations for the proposed Project and OHL are indicated in **Figure 20** and **Figure 21** below.

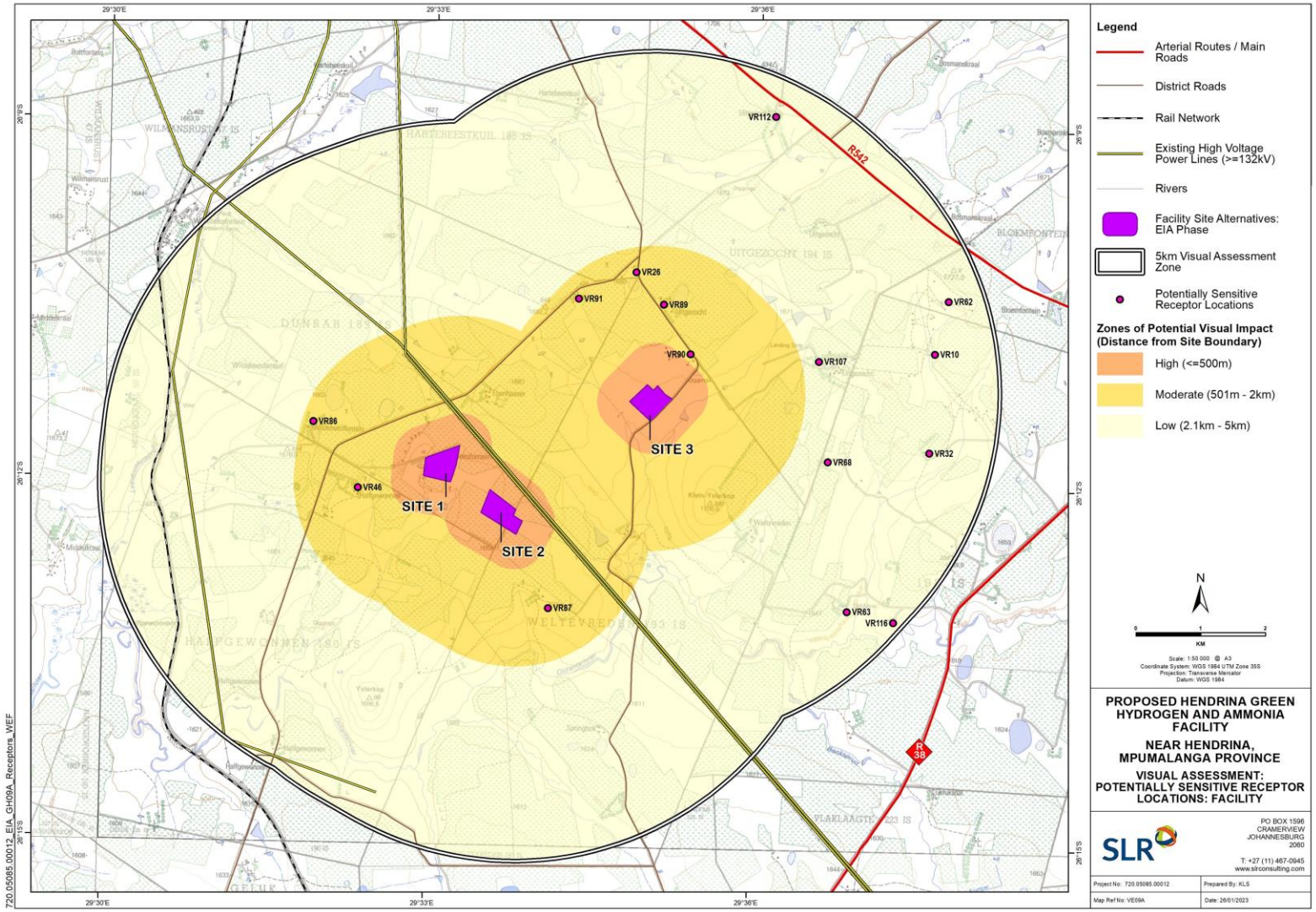

Figure 20: Receptor locations within 5km of the GHAF site alternatives

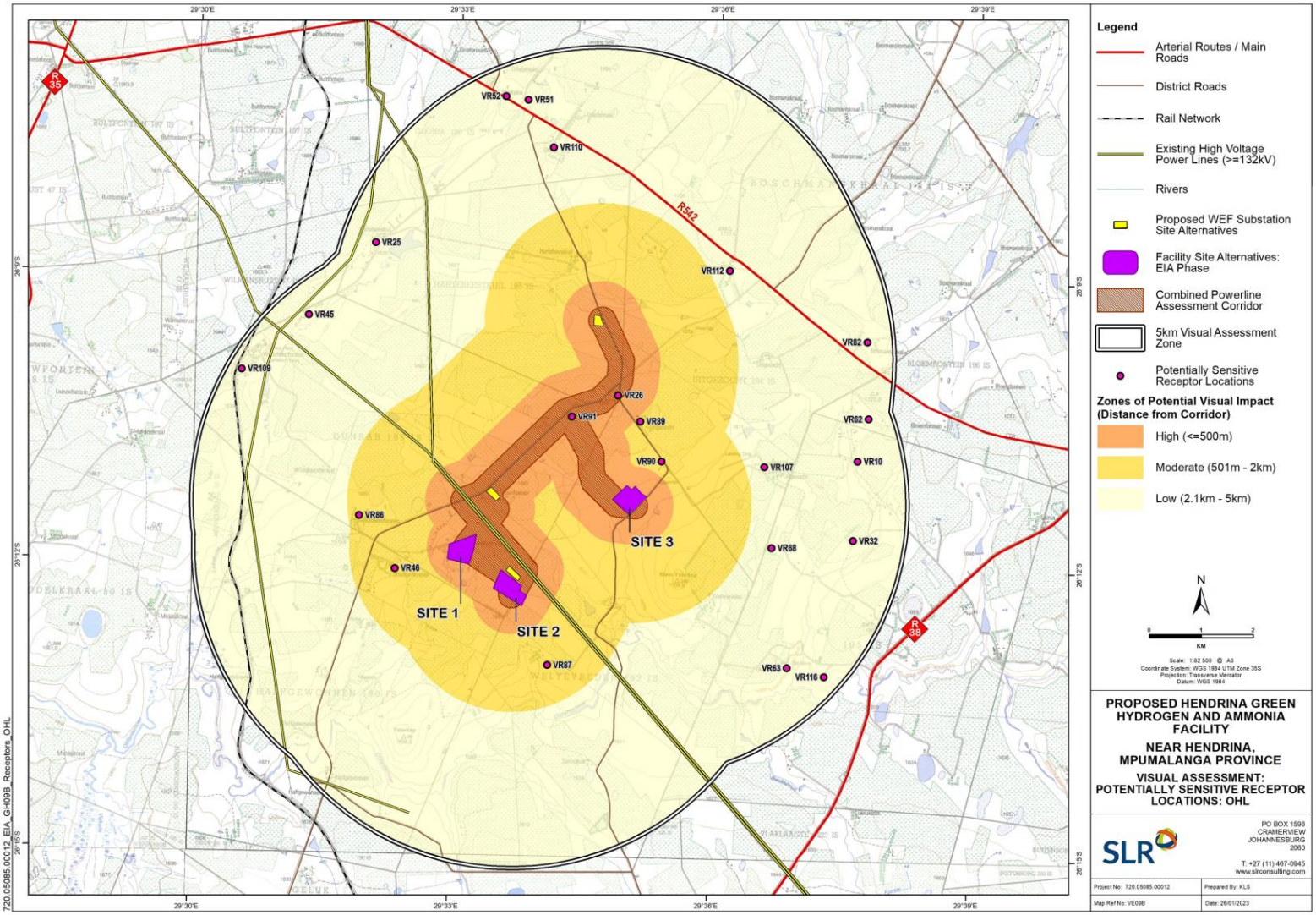

Figure 21: Receptor locations within 5kms of the OHL combined assessment corridor

8.2 RECEPTOR IMPACT RATING

A matrix is used to assess the impact of the proposed facility on each of the identified potentially sensitive receptor locations.

The matrix is based on the factors listed below:

- Distance of a receptor location away from the proposed development (zones of visual impact)
- Presence of screening elements (topography, vegetation etc.)
- Visual contrast of the development with the landscape pattern and form

These are considered to be the most important factors when assessing the visual impact of a proposed development on a potentially sensitive receptor location in this context. It should be noted that this rating matrix is a relatively simplified way of assigning a likely representative visual impact, which allows a number of factors to be considered. Experiencing visual impacts is however a complex and qualitative phenomenon and is thus difficult to quantify accurately. The matrix should therefore be seen as a representation of the likely visual impact at a receptor location. Part of its limitation lies in the quantitative assessment of what is largely a qualitative or subjective impact.

8.2.1 Distance

As described above, the distance of the viewer / receptor location from the development is an important factor in the context of experiencing visual impacts which will have a strong bearing on mitigating the potential visual impact. A high impact rating has been assigned to receptor locations that are located within 500m of the proposed Facility and within 500m of the nearest OHL assessment corridor. The visual impact of the Facility or powerline diminishes beyond 5km as the development would appear to merge with the elements on the horizon. Any visual receptor locations beyond these distance limits have therefore not been assessed as they fall outside the study area and would not be visually influenced by the proposed development.

At this stage of the process, zones of visual impact for the proposed Facility and OHL have been delineated according to distance from the boundary of the Facility site alternatives and from the combined OHL assessment corridors. Based on the height and scale of the project, the distance intervals chosen for the zones of visual impact, as shown in **Figure 20** and **Figure 21** are as follows:

- 0 – 500 m (high impact zone);
- 500 m – 2 km (moderate impact zone);
- 2 km – 5 km (low impact zone).

8.2.2 Screening Elements

The presence of screening elements is an equally important factor in this context. Screening elements can be vegetation, buildings and topographic features. For example, a grove of trees or a series of low hills located between a receptor location and an object could completely shield the object from the receptor.

8.2.3 Visual Contrast

The visual contrast of a development refers to the degree to which the development would be congruent with the surrounding environment. This is based on whether or not the development would conform to the land use, settlement density, structural scale, form and pattern of natural elements that define the structure

of the surrounding landscape. Visual compatibility is an important factor to be considered when assessing the impact of the development on receptors within a specific context. A development that is incongruent with the surrounding area could change the visual character of the landscape and have a significant visual impact on sensitive receptors.

In order to determine the likely visual compatibility of the proposed development, the study area was classified into the following zones of visual contrast:

- High –
  - undeveloped / natural / rural areas.
- Moderate –
  - areas within 500m of existing power lines (>=88kV);
  - areas within 500m of main roads;
  - areas within 500m of railway infrastructure;
  - cultivated land.
- Low –
  - areas within 500m of urban / built-up areas;
  - areas within 500m of mines / quarries etc.

These zones are depicted in **Figure 22** below

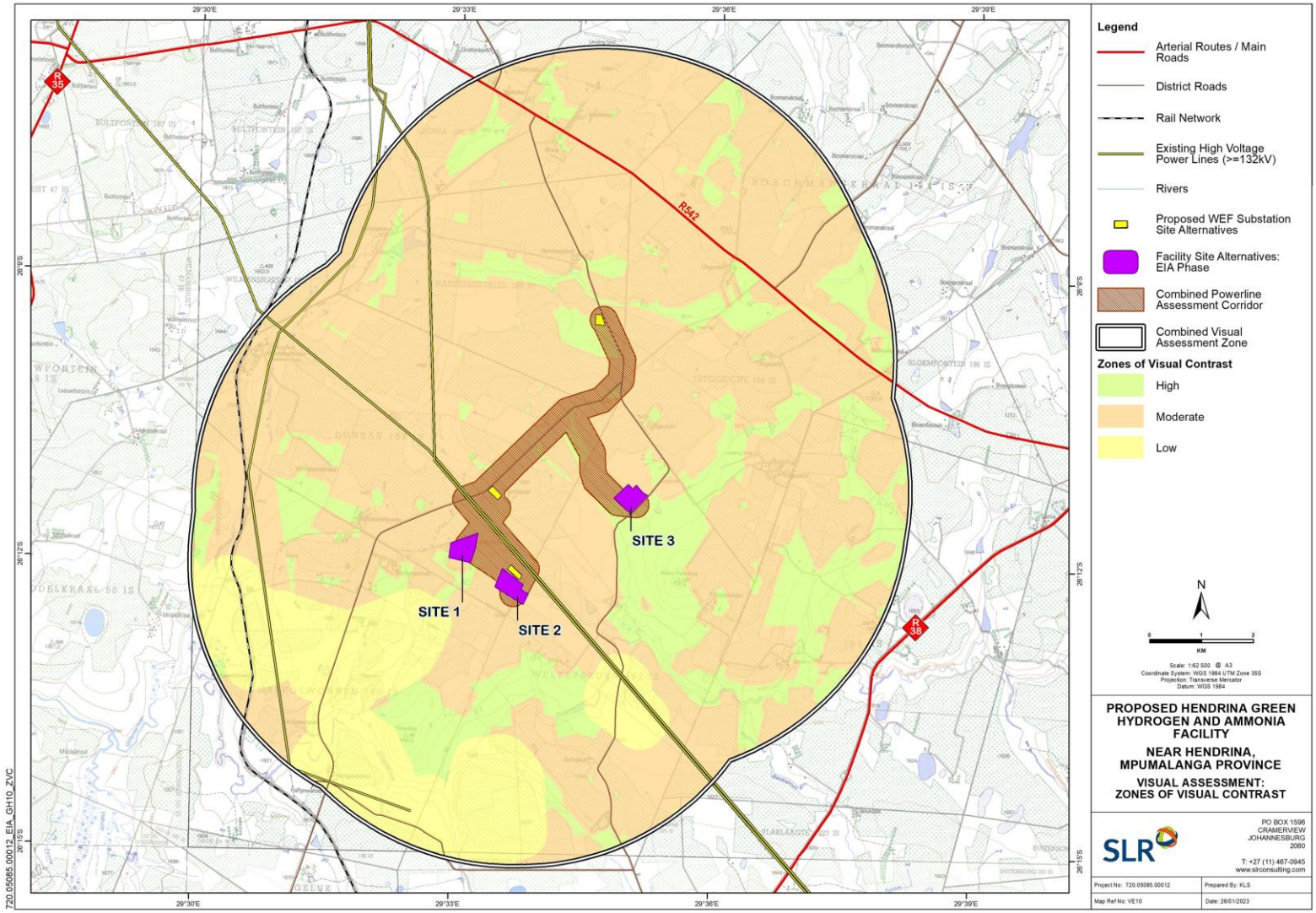

Figure 22: Zones of Visual Contrast

8.2.4 Impact Rating Matrix

The receptor impact rating matrix returns a score which in turn determines the visual impact rating assigned to each receptor location (**Table 3**) below.

Table 3: Rating Scores

Rating	Overall Score
High Visual Impact	8-9
Moderate Visual Impact	5-7
Low Visual Impact	3-4
Negligible Visual Impact	(Overriding factor)

An explanation of the matrix is provided in **Table 4**.

Table 4: Visual assessment matrix used to rate the impact of the proposed development on potentially sensitive receptors

VISUAL FACTOR	VISUAL IMPACT RATING			
	HIGH	MODERATE	LOW	OVERRIDING FACTOR: NEGLIGIBLE
Distance of receptor away from proposed development	Facility: <= 500m OHL: <= 500m **Score 3**	Facility: 500M - 2km OHL: 500m - 2km **Score 2**	Facility: 2km - 5km OHL: 2km - 5km **Score 1**	Facility: >5km OHL: >5km
Presence of screening factors	No / almost no screening factors – development highly visible **Score 3**	Screening factors partially obscure the development **Score 2**	Screening factors obscure most of the development **Score 1**	Screening factors completely block any views towards the development, i.e. the development is not within the viewshed
Visual Contrast	**High contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 3**	**Moderate contrast** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 2**	**Corresponds** with the pattern and form of the natural landscape elements (vegetation and land form), typical land use and/or human elements (infrastructural form) **Score 1**	

The full receptor impact rating for tables the Facility and for the OHL are provided in **Appendix B**. Summaries of the anticipated visual impacts of each project on the identified receptors are however provided below.

8.2.5 Facility

Table 5 below presents a summary of the overall visual impact of the proposed Facility on each of the potentially sensitive visual receptor locations identified within 5kms of the GHAF site alternatives.

Table 5: Summary receptor impact rating for the proposed Facility

OVERALL IMPACT RATING	NUMBER OF SENSITIVE RECEPTORS	TOTAL NUMBER OF POTENTIALLY SENSITIVE RECEPTORS
HIGH	0	0
MODERATE	0	8
LOW	0	2
TOTAL INCLUDED IN ASSESSMENT	***0***	***10***
OUTSIDE VIEWSHED	***0***	***4***

The table above shows that only fourteen (14) receptors were identified within 5kms of the GHAF site alternatives, none of which are considered sensitive. All of the receptors identified are assumed to be farmsteads and although these residences could be considered to be receptors, not all of them would be sensitive to the proposed development.

Four (4) of the identified receptors were found to be outside the viewshed for the Facility site alternatives and were excluded from the assessment. None of the remaining receptors are expected to experience high levels of visual impact. Eight (8) potentially sensitive receptors are expected to experience moderate levels of visual impact, five (5) of which are actually located within either the Hendrina North WEF or Hendrina South WEF project areas. In these cases, it has been assumed that the relevant land owners are involved in the project and as such are not expected to perceive the proposed development in a negative light.

The remaining two (2) receptors would only experience low levels of visual impact.

8.2.6 OHL

Table 6 below presents a summary of the overall visual impact of the proposed OHL on each of the potentially sensitive visual receptor locations identified within 5kms of the boundary of the combined assessment corridor.

Table 6: Summary receptor impact rating for the proposed OHL

OVERALL IMPACT RATING	NUMBER OF SENSITIVE RECEPTORS	TOTAL NUMBER OF POTENTIALLY SENSITIVE RECEPTORS
HIGH	0	1
MODERATE	0	11
LOW	0	5
TOTAL INCLUDED IN ASSESSMENT	***0***	***17***
OUTSIDE VIEWSHED	***0***	***5***

The table above shows that twenty-two (22) receptors were identified within 5kms of the combined assessment corridor, none of which are considered sensitive. All of the receptors identified are assumed to be farmsteads and although these residences could be considered to be receptors, not all of them would be sensitive to the proposed development.

Five (5) of the identified receptors were found to be outside the viewshed for the OHL alternatives and were excluded from the assessment. Only one receptor is expected to experience high levels of visual impact, this being VR91. As this receptor is located within the Hendrina North WEF project area, it has been assumed that the relevant land owners are involved in the project and as such are not expected to perceive the proposed development in a negative light.

Eleven (11) potentially sensitive receptors are expected to experience moderate levels of visual impact, six (6) of which are also located within either the Hendrina North WEF or Hendrina South WEF project areas. In these cases, the relevant land owners are not expected to perceive the proposed development in a negative light.

The remaining five (5) receptors would only experience low levels of visual impact.

8.3 NIGHT-TIME IMPACTS

The visual impact of lighting on the nightscape is largely dependent on the existing lighting present in the surrounding area at night. The night scene in areas where there are numerous light sources will be visually degraded by the existing light pollution and therefore additional light sources are unlikely to have a significant impact on the nightscape. In contrast, introducing new light sources into a relatively dark night sky will impact on the visual quality of the area at night. It is thus important to identify a night-time visual baseline before exploring the potential visual impact of the proposed Facility and associated OHL.

Coal mining operations in the south-western sector of the study area are the main sources of light in the vicinity of the proposed Project. These elements are expected to have a significant impact on the night scene in this sector of the study area.

Other light sources in the broader area would largely emanate from the farmsteads dotted across the study area, and also from vehicles travelling along the district roads.

Overall, the visual character of the night environment within the study area is considered to be moderately 'polluted' and will therefore not be regarded as pristine. While the operational and security lighting required for the proposed Facility is likely to intrude on the nightscape, the impact of the additional lighting is expected to be reduced by the significant amount of light already present within the surrounding area at night.

Power lines and associated towers or pylons are not generally lit up at night and, thus light spill associated with the proposed OHL is not expected to intrude on the nightscape to any significant degree.

It should be noted that the Facility and the OHL will be located within the Hendrina North and Hendrina South WEF project areas and as such, the lighting impacts from the proposed Facility and OHL would be subsumed by the glare and contrast of the lights associated with the WEFs.

8.4 CUMULATIVE IMPACTS

Although it is important to assess the visual impacts of the proposed production facility specifically, it is equally important to assess the cumulative visual impact that could materialise as a result of this development. Cumulative impacts occur where existing or planned developments, in conjunction with the proposed development, result in significant incremental changes in the broader study area. In this instance, such developments would include:

- existing and proposed mining / quarrying activities,
- electrical infrastructure; and
- other existing / proposed renewable energy facilities within a 30km radius.

Existing mining / quarrying and electrical infrastructure have already resulted in large scale visual impacts, especially to the south-west of the Facility. These developments have significantly altered the sense of place and visual character in the broader region. It is known that there are several existing (active), abandoned and proposed Mining Right Areas (MRAs) and Prospecting Right Areas in the vicinity of the Hendrina Renewable Energy Complex. As such the future expansion of mining activity and further transformation of the landscape in this area is a distinct possibility.

Renewable energy facilities have the potential to cause large-scale visual impacts, and although the level of transformation already present in the landscape will reduce the contrast and overall visual impact of the new development, the incremental change in the landscape will be increased and the visual impacts on surrounding visual receptors would be exacerbated. Although the South African Renewable Energy EIA Application Database from DFFE does not record any existing or proposed renewable projects within 30kms of the Facility, a cumulative assessment must include all elements of the proposed Hendrina Renewable Energy Complex. This complex, including WEFs and associated grid connection infrastructure, will affect a large portion of the study area.

From a visual perspective, the concentration of renewable energy facilities, in conjunction with the Facility as proposed will further change the visual character of the area and alter the inherent sense of place, extending an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the

implementation of the recommended mitigation measures. In addition, it is possible that these developments in close proximity to each other could be seen as one large Renewable Energy Facility (REF) rather than several separate developments. Although this will not necessarily reduce impacts on the visual character of the area, it could potentially reduce the cumulative impacts on the landscape.

8.5 IDENTIFICATION OF POTENTIAL IMPACTS

Potential visual issues / impacts resulting from the proposed Facility and associated OHL together with possible mitigation measures are outlined below.

8.5.1 Construction Phase

Nature of the impact

- Potential visual intrusion resulting from large construction vehicles and equipment;
- Potential visual effect of construction laydown areas and material stockpiles.
- Potential impacts of increased dust emissions from construction activities and related traffic;
- Potential visual scarring of the landscape as a result of site clearance and earthworks; and
- Potential visual pollution resulting from littering on the construction site

Significance of impact

The significance of visual impacts during construction are expected to be **Moderate** but will be reduced to **Low** with the implementation of mitigation measures.

8.5.2 Operation Phase

Nature of the impact

- Potential alteration of the visual character of the area;
- Potential visual intrusion resulting from the various components of the Facility and OHL;
- Potential visual effect on surrounding farmsteads; and
- Potential visual impact on the night-time visual environment.

Significance of impact

The significance of visual impacts associated with the Facility during operation are expected to be **Moderate**, and although mitigation measures will result in some minor reduction of visual impacts, the degree of significance will remain **Moderate**.

The significance of visual impacts associated with the OHL during operation are expected to be **Low**, but will be further reduced with the implementation of mitigation measures.

8.5.3 Decommissioning Phase

Nature of the impact

- Potential visual intrusion resulting from vehicles and equipment involved in the decommissioning process;
- Potential impacts of increased dust emissions from decommissioning activities and related traffic;
- Potential visual scarring of the landscape as a result of decommissioning activities; and

- Potential visual intrusion of any remaining infrastructure on the site.

Significance of impact

The significance of visual impacts during decommissioning are expected to be **Moderate** but will be reduced to **Low** with the implementation of mitigation measures.

8.5.4 Cumulative Impacts

Nature of the impact

- Combined visual impacts from mining, infrastructural and renewable energy development in the broader area could potentially alter the sense of place and visual character of the area; and
- Combined visual impacts from mining, infrastructural and renewable energy development in the broader area could potentially exacerbate visual impacts on visual receptors.

Significance of impact

The significance of cumulative visual impacts are **Moderate**, and although mitigation measures will result in some minor reduction of visual impacts, the degree of significance will remain **Moderate**.

9. OVERALL IMPACT RATING

The EIA Regulations, 2014 (as amended) require that an overall rating for visual impact be provided to allow the visual impact to be assessed alongside other environmental parameters. The tables below present the impact matrix for visual impacts associated with the proposed construction and operation of the proposed green hydrogen and ammonia production facility. Preliminary mitigation measures have been determined based on best practice and literature reviews.

An explanation of the impact rating methodology is provided in **Appendix C**.

9.1 CONSTRUCTION PHASE

9.1.1 Impact Rating

Table 7: Impact Rating for Hendrina Green Hydrogen Ammonia Production Facility during the construction phase

CONSTRUCTION PHASE: DIRECT IMPACTS																		
Impact number	**Aspect**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**						
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**	**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**
Impact 1:	Visual impacts	▪ Large construction vehicles, equipment and construction material stockpiles will alter the natural character of the study area and expose visual receptors to impacts associated with construction. ▪ Construction activities may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ Temporary stockpiling of soil during construction may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the construction site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil resulting in visual scarring of the landscape and increasing the level of visual contrast with the surrounding environment. ▪ Potential visual pollution resulting from littering on the construction site.	Construction	Negative	Moderate	3	2	3	4	3	**40**	**N3**	2	2	3	2	2	**18**	**N2**
					Significance	**N3- Moderate**							**N2 - Low**						

9.1.2 Mitigation Measures

- Carefully plan to minimise the construction period and avoid construction delays.
- Position laydown areas and related storage/stockpile areas in unobtrusive positions in the landscape, where possible.
- Minimise vegetation clearing and rehabilitate cleared areas as soon as possible.
- Vegetation clearing should take place in a phased manner.
- Make use of existing gravel access roads where possible.
- Limit the number of vehicles and trucks travelling to and from the proposed sites, where possible.
- Ensure that dust suppression techniques are implemented:
  - on all access roads;
  - in all areas where vegetation clearing has taken place;
  - on all soil stockpiles.
- Maintain a neat construction site by removing litter, rubble and waste materials regularly.

9.2 OPERATION PHASE

9.2.1 Impact Rating

Table 8: Impact Rating for Hendrina Green Hydrogen Ammonia Production Facility during the operation phase

OPERATION PHASE: DIRECT IMPACTS																		
Impact number	**Aspect**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**						
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**	**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**
Impact 1:	Visual impacts	▪ The development may be perceived as an unwelcome visual intrusion, particularly in more natural undisturbed settings. ▪ The proposed GHAF and associated infrastructure will alter the visual character of the surrounding area and expose potentially sensitive visual receptor locations to visual impacts. ▪ Dust emissions and dust plumes from maintenance vehicles accessing the site via gravel roads may evoke negative sentiments from surrounding viewers. ▪ The night time visual environment will be altered as a result of operational and security lighting at the proposed GHAF.	Operation	Negative	Moderate	3	3	3	4	4	**52**	**N3**	3	3	3	4	4	**52**	**N3**
					Significance	**N3- Moderate**							**N3 – Moderate**						

9.2.2 Mitigation Measures

- Restrict vegetation clearance on the site and along the OHL servitude to that which is required for the correct operation of the Facility and or OHL.
- As far as possible, limit the number of maintenance vehicles which are allowed to access the site.
- Ensure that dust suppression techniques are implemented on all gravel access roads.
- As far as possible, limit the amount of security and operational lighting present on site.
- Light fittings for security at night should reflect the light toward the ground and prevent light spill (as far as possible).
- Lighting fixtures should make use of minimum lumen or wattage (whilst adhering to relevant safety standards).
- Mounting heights of lighting fixtures should be limited, or alternatively, foot-light or bollard level lights should be used (whilst adhering to relevant safety standards).
- If economically and technically feasible, make use of motion detectors on security lighting.

9.3 DECOMMISSIONING PHASE

9.3.1 Impact Rating

Table 9: Impact Rating for Hendrina Green Hydrogen Ammonia Production Facility during the decommissioning phase

DECOMMISSIONING PHASE: DIRECT IMPACTS																		
Impact number	**Aspect**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**					
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**	**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**
Impact 1:	Visual impacts	▪ Vehicles and equipment required for decommissioning will alter the natural character of the study area and expose visual receptors to visual impacts. ▪ Decommissioning activities may be perceived as an unwelcome visual intrusion. ▪ Dust emissions and dust plumes from increased traffic on the gravel roads serving the decommissioning site may evoke negative sentiments from surrounding viewers. ▪ Surface disturbance during construction would expose bare soil resulting in visual scarring of the landscape and increasing the level of visual contrast with the surrounding environment. ▪ Temporary stockpiling of soil during decommissioning may alter the flat landscape. Wind blowing over these disturbed areas could result in dust which would have a visual impact.	Decommissioning	Negative	Moderate	3	2	3	4	3	**40**	**N3**	2	2	3	2	2	**18**	**N2**
					Significance	**N3- Moderate**							**N2 - Low**						

9.3.2 Mitigation Measures

- All infrastructure that is not required for post-decommissioning use should be removed.
- Carefully plan to minimize the decommissioning period and avoid delays.
- Maintain a neat decommissioning site by removing rubble and waste materials regularly.
- Ensure that dust suppression procedures are maintained on all gravel access roads throughout the decommissioning phase.
- All cleared areas should be rehabilitated as soon as possible.
- Rehabilitated areas should be monitored post-decommissioning and remedial actions implemented as required.

9.4 CUMULATIVE IMPACTS

9.4.1 Impact Rating

Table 10: Cumulative Impact Rating for Hendrina Green Hydrogen Ammonia Production Facility

CUMULATIVE IMPACTS																		
Impact number	**Aspect**	**Description**	**Stage**	**Character**	**Ease of Mitigation**	**Pre-Mitigation**							**Post-Mitigation**						
						(M+	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**	**(M+**	**E+**	**R+**	**D)x**	**P=**	**S**	**Rating**
Impact 1:	Visual impacts	▪ Proposed mining, infrastructural and renewable energy developments in the broader area will alter the natural character of the study area towards a more industrial landscape and expose a greater number of receptors to visual impacts. ▪ Visual intrusion of mining, infrastructural and renewable energy developments may be exacerbated, particularly in more natural undisturbed settings. ▪ Additional mining, infrastructural and renewable energy facilities in the area would generate additional traffic on gravel roads thus resulting in increased impacts from dust emissions and dust plumes. ▪ The night time visual environment could be altered as a result of operational and security lighting serving new developments in the broader area.	All stages	Negative	Moderate	5	3	3	5	4	**64**	**N4**	4	3	3	4	4	**56**	**N3**
					Significance	**N4- High**							**N3 - Moderate**						

9.4.2 Mitigation Measures

- Implementation of the mitigation measures as recommended above.

10. COMPARATIVE ASSESSMENT OF ALTERNATIVES

A comparative assessment has been undertaken in respect of the substation and power line route alternatives put forward for the EIA phase of this project. The aim of the comparative assessment is to determine which of the alternatives would be preferred from a visual perspective. Preference ratings for each alternative have been based on the following factors:

- The location of each alternative in relation to areas of high elevation, especially ridges, koppies or hills;
- The location of each alternative in relation to sensitive visual receptor locations; and
- The location of each alternative in relation to areas of natural vegetation (clearing site for the development increases the visibility).

The alternatives are rated as preferred; favourable, least-preferred or no-preference described in Table 11 below.

Table 11: Description of preference ratings applied to alternatives

PREFERRED	The alternative will result in a low impact / reduce the impact
FAVOURABLE	The impact will be relatively insignificant
LEAST PREFERRED	The alternative will result in a high impact / increase the impact
NO PREFERENCE	The alternative will result in equal impacts

Three possible alternatives are being considered for the Facility, each with three route alignment options for the associated overhead powerlines (OHPs), as shown in Figure 3, Figure 4 and Figure 5.

No fatal flaws have been identified in respect of any of the site alternatives or OHL route alignments being proposed for the Project. In addition, no preference was determined for any of the Facility site alternatives, although GHAF Site Alternative 3 was found to be **Least Preferred**. A detailed comparative assessment table is provided in **Appendix D**, although a summary of the preliminary findings is provided in **Table 12** below.

Table 12: Preliminary Site Alternative Preference Ratings

Alternative	Preference Rating
Site Alternative 1	**Favourable**
• OHL Alternative 1: Option 1	Favourable
• OHL Alternative 1: Option 2	Least Preferred
• OHL Alternative 1: Option 3	Favourable
Site Alternative 2	**Favourable**
• OHL Alternative 2: Option 1	Favourable

• OHL Alternative 2: Option 2	Least Preferred
• OHL Alternative 2: Option 3	Favourable
Site Alternative 3	**Least Preferred**
• OHL Alternative 3: Option 1	Favourable
• OHL Alternative 3: Option 2	Favourable
• OHL Alternative 3: Option 3	Favourable

11. CONCLUSION

A visual study was conducted to assess the magnitude and significance of the potential visual impacts associated with the development of the proposed Hendrina GHAF and associated OHL infrastructure near Hendrina in Mpumalanga Province. The VIA has demonstrated that the study area has a somewhat mixed visual character, transitioning from the heavily transformed landscape associated with the collieries and associated mining activities to the south-west of the proposed development, to a more rural / pastoral character across the remainder of the study area. Hence, although the Facility and OHL development would alter the visual character and contrast with this rural / pastoral character, the location of the development in relatively close proximity to mining activities and the associated power lines and rail infrastructure will significantly reduce the level of contrast.

A broad-scale assessment of visual sensitivity, based on the physical characteristics of the study area, economic activities and land use that predominates, determined that the area would have a low visual sensitivity. However, an important factor contributing to the visual sensitivity of an area is the presence, or absence of visual receptors that may value the aesthetic quality of the landscape and depend on it to produce revenue and create jobs. No formal protected areas, leisure-based tourism activities or sensitive receptor locations were identified in the study area, thus confirming the low level of visual sensitivity.

The desktop assessment did however identify multiple farmsteads and residences within the study area that could be considered to be receptors, although not all of them would be sensitive to the proposed development. These farmsteads are however regarded as *potentially* sensitive visual receptors as elements of the proposed development could potentially alter natural or semi-natural vistas experienced from these locations. At this stage however, local sentiments towards the proposed development are not known.

Only fourteen (14) potentially sensitive receptors were identified within 5kms of the Facility site alternatives, none of which are considered sensitive. Four (4) of the identified receptors were found to be outside the viewshed for the Facility site alternatives and were excluded from the assessment. None of the remaining receptors are expected to experience high levels of visual impact. Eight (8) potentially sensitive receptors are expected to experience moderate levels of visual impact, five (5) of which are actually located within either the Hendrina North WEF or Hendrina South WEF project areas. In these cases, it has been assumed that the relevant land owners are involved in the Hendrina renewable energy complex project and as such are not expected to perceive the proposed development in a negative light. The remaining two (2) receptors would only experience low levels of visual impact as a result of the Facility.

Twenty-two (22) receptors were identified within 5kms of the combined OHL assessment corridor, none of which are considered sensitive. Five (5) of the identified receptors were found to be outside the viewshed for the OHL alternatives and were excluded from the assessment. Only one receptor is expected to experience high levels of visual impact, this being VR91. As this receptor is located within the Hendrina North WEF project area, it has been assumed that the relevant land owners are involved in the project and as such are not expected to perceive the proposed development in a negative light. Eleven (11) potentially sensitive receptors are expected to experience moderate levels of visual impact, six (6) of which are also located within either the Hendrina North WEF or Hendrina South WEF project areas. In these cases, the relevant land owners are not expected to perceive the proposed development in a negative light. The remaining five (5) receptors would only experience low levels of visual impact as a result of the OHL development.

A preliminary assessment of overall impacts revealed that impacts associated with the proposed Facility and associated OHL infrastructure (post mitigation) are of low significance during both construction and decommissioning phases. During operation however, visual impacts (post mitigation) from the Facility would be of moderate significance with relatively few mitigation measures available to reduce the visual impact. Visual impacts associated with the OHL infrastructure during operation would be of low significance.

Considering the presence of existing and proposed mining activity and electrical generation and distribution infrastructure, the introduction of this type of facility in the area will result in further change in the visual character of the area and alteration of the inherent sense of place, extending an increasingly industrial character into the broader area, and resulting in significant cumulative impacts. It is however anticipated that these impacts could be mitigated to acceptable levels with the implementation of the recommended mitigation measures. In light of this, cumulative impacts have been rated as moderate.

A comparative assessment of site alternatives for the Facility was undertaken in order to determine which of the alternatives and associated grid connection infrastructure would be preferred from a visual perspective. No fatal flaws were identified in respect of any of the site alternatives or OHL route alignments being proposed for the Project. In addition, no preference was determined for any of the Facility site alternatives, although GHAF Site Alternative 3 was found to be **Least Preferred**.

11.1. VISUAL IMPACT STATEMENT

It is SLR's opinion that the potential visual impacts associated with the proposed Hendrina GHAF and the associated OHL infrastructure are negative and of moderate significance. Given the relatively low number of potentially sensitive receptors and the significant level of human transformation and landscape degradation in areas near the proposed Facility, the project is deemed acceptable from a visual perspective and the EA should be granted.

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Appendix A

SEPCIALIST EXPERTISE

CURRICULUM VITAE

KERRY LIANNE SCHWARTZ

SENIOR GIS CONSULTANT

EMPA, South Africa

QUALIFICATIONS

BA	1982	Geography, Leeds Trinity University, UK

EXPERTISE

- GIS, spatial modelling and 3D analysis
- Visual Impact Assessment
- Fatal Flaw Assessments
- Glint and Glare Assessments

Kerry is a highly focused and dedicated Spatial Professional with strong technical skills and some 27 years' experience in the application and use of geographic analysis and geospatial technologies in support of a range of environmental and development planning projects. While Kerry's expertise is largely centred on the management and presentation of geospatial data for environmental impact assessments, her GIS skills are frequently utilised in support of a range of other projects, including:

- Strategic environmental assessments and management plans;
- Visual and landscape assessments;
- Glint and glare assessments;
- Wetland / surface water assessments;
- Catchment delineation for floodline analysis;
- Urban and Rural Development Planning;
- Transport Assessments; and
- Infrastructure Development Planning.

Kerry has extended her skills base to include the undertaking of specialist Visual Impact Assessments (VIAs) for a range of projects, including renewable energy, power line and residential / mixed-use developments.

PROJECTS

A selection of Kerry's key project's are presented below.

	Built Infrastructure
EIA and EMP for a 9km railway line and water pipeline for manganese mine – Kalagadi Manganese	Kerry was responsible for GIS analysis and mapping in support of the EIA project in the Northern Cape, South Africa.
EIA and EMP for 5x 440kV Transmission Lines between Thyspunt (proposed nuclear power station site) and several substations	Kerry was responsible for GIS analysis and mapping in support of the EIA project in the Port Elizabeth area in the Eastern Cape, South Africa.

EIA for multi petroleum products pipeline from Kendall Waltloo, and from Jameson Park to Langlaagte Tanks farms Pipelines	Kerry was responsible for GIS analysis and mapping in support of the EIA project.
Environmental Management Plan for copper and cobalt mine	Kerry was responsible for GIS analysis and mapping in support of the EMP project in the Democratic Republic of Congo.
EIA and Agricultural Feasibility study for Miwani Sugar Mill	Kerry was responsible for GIS analysis and mapping in support of the EIA project in Kenya.
EIAs for several Solar Photovoltaic Energy Facilities and associated infrastructure	Kerry was responsible for GIS analysis and mapping in support of several EIAs for Solar PV facilities, the most recent projects being: • Oya Energy Facility (Western Cape Province); • Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV Facilities (Northern Cape Province); and • Sendawo 1, 2 and 3 Solar Energy Facilities (North West Province).
EIAs / BAs for several WEFs and associated infrastructure	Kerry was responsible for GIS analysis and mapping in support of several EIAs for Wind Energy Farms, the most recent projects being: • Tooverberg WEF (Western Cape Province); • Rondekop WEF (Western Cape Province); and • Graskoppies, Hartebeest Leegte, Ithuba and !Xha Boom (Leeuwberg Cluster) WEFs (Northern Cape Province).
Basic Assessments for various 400kV and 132kV Distribution Lines for the Transnet Coal Link Upgrade Project	Kerry was responsible for GIS analysis and mapping in support of the powerline BA project in KwaZulu-Natal and Mpumalanga, South Africa.
Environmental Assessment for the proposed Moloto Development Corridor	Kerry was responsible for GIS analysis and mapping in support of the EIA project in the Limpopo Province.
Environmental Advisory Services for the Gauteng Rapid Rail Extensions Feasibility Project	Kerry was responsible for GIS analysis and mapping in support of a feasibility study for a rail extension in Gauteng, South Africa.
Environmental Screening for the Strategic Logistics and Industrial Corridor Plan for Strategic Infrastructure Project 2	Kerry was responsible for GIS analysis and mapping in support of the environmental screening for strategic infrastructure in KwaZulu-Natal, the Free State and Gauteng.

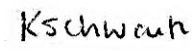
Fatal Flaw Assessments for various proposed Renewable Energy Facilities	Kerry was responsible for GIS analysis and mapping in support of fatal flaw assessment for renewable energy projects in the Northern Cape and Western Cape Provinces.
	Strategic Planning
Lesotho Highlands Development Association – Lesotho	GIS database development for socio-economic and health indicators arising from Social Impact Assessments
Development Plans for the adjacent towns of Kasane and Kazungula and for the rural village of Hukuntsi	Kerry was responsible for GIS database management, spatial data analysis and mapping for the development plans for towns in Botswana.
Integrated Development Plans for various District and Local Municipalities	Kerry was responsible for GIS database management, spatial data analysis and mapping for various IDPs for District Municipalities in KwaZulu-Natal.
Rural Development Initiative and Rural Roads Identification for uMhlathuze Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for rural road identification in the uMhlathuze Local Municipality in KwaZulu-Natal.
Tourism Initiatives and Master Plans for areas such as the Mapungubwe Cultural Landscape	Kerry was responsible for GIS database management, spatial data analysis and mapping for various Master Plans in the Limpopo and Northern Cape Provinces.
Spatial Development Frameworks for various Local and District Municipalities	Kerry was responsible for GIS database management, spatial data analysis and mapping for Spatial Development Frameworks for various Municipalities in KwaZulu-Natal, Mpumalanga and the Free State.
Land Use Management Plans/Systems (LUMS) for various Local Municipalities	Kerry was responsible for GIS database management, spatial data analysis and mapping for the development of Land Use Management Systems for various Local Municipalities in KwaZulu-Natal.
Land use study for the Johannesburg Inner City Summit and Charter	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Johannesburg Inner City land use study.
Due Diligence Investigation for the Port of Richards Bay	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Port of Richards Bay Due Diligence Investigation.
	State of the Environment Reporting
2008 State of the Environment Report for City of Johannesburg	Kerry was responsible for GIS database management, spatial data analysis and mapping for the 2008 Johannesburg State of the Environment Report.

	Strategic Environmental Assessments and Environmental Management Frameworks
SEA for Greater Clarens	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Greater Clarens SEA in the Free State Province.
SEA for the Marula Region of the Kruger National Park	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Marula Region SEA on behalf of SANParks.
SEA for Thanda Private Game Reserve	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Thanda Private Game Reserve SEA in KwaZulu-Natal.
SEA for KwaDukuza Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the KwaDukuza Local Municipality SEA in KwaZulu-Natal.
SEA for Molemole Local Municipality, Capricorn District Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Molemole Local Municipality SEA in Limpopo Province.
SEA for Blouberg Local Municipality, Capricorn District Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Blouberg Local Municipality in Limpopo Province.
SEA for the Bishopstowe study area in the Msunduzi Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Bishopstowee SEA in KwaZulu-Natal.
EMF for proposed Renishaw Estate	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Reinshaw Estate EMF in KwaZulu-Natal.
EMF for Mogale City Local Municipality, Mogale City Local Municipality	Kerry was responsible for GIS database management, spatial data analysis and mapping for the Mogale City Local Municipality EMF in Gauteng.
	Visual Impact Assessments
VIAs for various Solar Power Plants and associated grid connection infrastructure	Kerry was responsible for the GIS mapping and visual impact assessments for various Solar Power Plants and associated grid connection infrastructure (Northern Cape, Free State, Limpopo and North West Province) the most recent projects being: • Oya Energy Facility (Western Cape Province); • Mooi Plaats, Wonderheuvel and Paarde Valley Solar PV facilities (Northern Cape Province); and • Nokukhanya Solar PV Facility (Limpopo Province.

VIAs for various WEFs and associated grid connection infrastructure	Kerry was responsible for the GIS mapping and visual impact assessments for various Wind Energy Farms and associated grid connection infrastructure (Northern Cape and Western Cape), the most recent projects including: • Gromis and Komas WEFs (Northerrn Cape Province). • Paulputs WEF (Northern Cape Province); • Kudusberg WEF (Western Cape Province); • Tooverberg WEF (Western Cape Province); • Rondekop WEF (Northern Cape Province); and • San Kraal and Phezukomya WEFs (Northern Cape Province).
VIAs for various 400kV and 132kV Distribution Lines for the Transnet Coal Link Upgrade Project	Kerry was responsible for the GIS mapping and visual impact assessments for various powerlines in KwaZulu-Natal and Mpumalanga Provinces.
VIAs for the proposed Assagay Valley and Kassier Road North Mixed Use Development	Kerry was responsible for the GIS mapping and a visual impact assessment for the Assagay Valley and Kassier Road North Mixed Use Development in KwaZulu-Natal.
VIA for the proposed Tinley Manor South Banks Development	Kerry was responsible for the GIS mapping and a visual impact assessment for the Tinley Manor Southbanks Coastal Development in KwaZulu-Natal.
VIA for the proposed Tinley Manor South Banks Beach Enhancement Solution	Kerry was responsible for the GIS mapping and a visual impact assessment for the Tinley Beach Enhancement EIA in KwaZulu-Natal.
VIA for the proposed Mlonzi Hotel and Golf Estate Development	Kerry was responsible for the GIS mapping and a visual impact assessment for the Mlonzi Hotel and Golf Estate in the Eastern Cape.
Landscape Assessment for the Mogale City Local Municipality	Kerry was responsible for the GIS mapping and a visual impact assessment for the Mogale City Local Municipality landscape assessment.

MEMBERSHIPS

GISSA	Member of Geo-Information Society of South Africa
SAGC	Registered as GISc Technician with the South African Geomatics Council, Membership No. GTc GISc 1187



04 February 2022

10.4 The Specialist

Note: Duplicate this section where there is more than one specialist.

I Kerry Schwartz ……, as the appointed specialist hereby declare/affirm the correctness of the information provided as part of the application, and that I:

- in terms of the general requirement to be independent (tick which is applicable):

X	other than fair remuneration for work performed/to be performed in terms of this application, have no business, financial, personal or other interest in the activity or application and that there are no circumstances that may compromise my objectivity; or
	am not independent, but another EAP that is independent and meets the general requirements set out in Regulation 13 has been appointed to review my work (Note: a declaration by the review specialist must be submitted);

- have expertise in conducting specialist work as required, including knowledge of the Act, regulations and any guidelines that have relevance to the proposed activity;
- will ensure compliance with the EIA Regulations 2014;
- will perform the work relating to the application in an objective manner, even if this results in views and findings that are not favourable to the application;
- will take into account, to the extent possible, the matters listed in regulation **18** of the regulations when preparing the application and any report, plan or document relating to the application;
- will disclose to the proponent or applicant, registered interested and affected parties and the competent authority all material information in my possession that reasonably has or may have the potential of influencing any decision to be taken with respect to the application by the competent authority or the objectivity of any report, plan or document to be prepared by myself for submission to the competent authority (unless access to that information is protected by law, in which case I will indicate that such protected information exists and is only provided to the competent authority);
- declare that all the particulars furnished by me in this form are true and correct;
- am aware that it is an offence in terms of Regulation 48 to provide incorrect or misleading information and that a person convicted of such an offence is liable to the penalties as contemplated in section 49B(2) of the National Environmental Management Act, 1998 (Act 107 of 1998).

Kschwartz

Signature of the specialist

SLR Consulting (South Africa) (Pty) Ltd

Name of company

02 February 2023

Date

Appendix B

Receptor Impact Rating Tables

Receptor Impact Rating for Hendrina GHAF

Receptor Location	Distance to nearest Corridor Alternative			Screening		Contrast		OVERALL IMPACT RATING	
	KMs	Rating		Rating		Rating		Rating	
INSIDE VIEWSHED									
*VR26 - Farmstead^*	*1.7*	*Mod*	*2*	*Mod*	*2*	*Mod*	*2*	*MODERATE*	*6*
VR46 - Farmstead	4.1	Low	1	Low	1	Mod	2	LOW	4
VR68 - Farmstead	1.0	Mod	2	Mod	2	Mod	2	MODERATE	6
VR86 - Farmstead#	*4.5*	*Low*	*1*	*High*	*3*	*Mod*	*2*	*MODERATE*	*6*
VR87 - Farmstead#	*1.8*	*Mod*	*2*	*Mod*	*2*	*High*	*3*	*MODERATE*	*7*
VR89 - Farmstead	1.2	Mod	2	Low	1	Mod	2	MODERATE	5
VR90 - Farmstead	1.3	Mod	2	High	3	Mod	2	MODERATE	7
*VR91 - Farmstead^*	*0.7*	*Mod*	*2*	*High*	*3*	*Mod*	*2*	*MODERATE*	*7*
VR107 - Farmstead	2.3	Low	1	Low	1	Mod	2	LOW	4
*VR112 - Farmstead^*	*4.5*	*Low*	*1*	*Mod*	*2*	*Mod*	*2*	*MODERATE*	*5*
OUTSIDE VIEWSHED									
VR10	*4.1*	*NIL*							
VR63	*4.2*								
VR68	*2.6*								
VR116	*4.8*								

^Receptor is inside the Hendrina North WEF Project Area
#Receptor is inside the Hendrina South WEF Project Area

Receptor Impact Rating for Hendrina GHAF Grid Connection Infrastructure

Receptor Location	Distance to nearest Turbine		Screening		Contrast		OVERALL IMPACT RATING	
	KMs	Rating	Rating		Rating		Rating	
INSIDE VIEWSHED								
*VR25 - Farmstead^*	*4.3*	*Low*	*1*	*Mod*	*2*	*Mod*	*2*	*MODERATE*	*5*
*VR26 - Farmstead^*	*0.0*	*High*	*3*	*Mod*	*2*	*Mod*	*2*	*MODERATE*	*7*
VR32 - Farmstead	4.0	Low	1	Low	1	Mod	2	LOW	4
*VR45 - Farmstead^*	*4.4*	*Low*	*1*	*Low*	*1*	*Mod*	*2*	*LOW*	*4*
VR46 - Farmstead	1.2	Mod	2	Low	1	Mod	2	MODERATE	5
VR51 - Farmstead	4.2	Low	1	Low	1	Mod	2	LOW	4
VR52 - Farmstead	4.4	Low	1	Mod	2	Mod	2	MODERATE	5
VR62 - Farmstead	4.5	Low	1	Mod	2	High	3	MODERATE	6
VR86 - Farmstead#	*1.8*	*Mod*	*2*	*High*	*3*	*Mod*	*2*	*MODERATE*	*7*
VR87 - Farmstead#	*1.3*	*Mod*	*2*	*Mod*	*2*	*High*	*3*	*MODERATE*	*7*
VR89 - Farmstead	0.6	Mod	2	Low	1	Mod	2	MODERATE	5
VR90 - Farmstead	0.8	Mod	2	High	3	Mod	2	MODERATE	7
*VR91 - Farmstead^*	*0.0*	*High*	*3*	*High*	*3*	*Mod*	*2*	*HIGH*	*8*
VR107 - Farmstead	2.4	Low	1	Low	1	Mod	2	LOW	4
VR109 - Farmstead	4.7	Low	1	Mod	2	Mod	2	MODERATE	5
VR110 - Farmstead	3.2	Low	1	Low	1	Mod	2	LOW	4
*VR112 - Farmstead^*	*2.4*	*Low*	*1*	*Mod*	*2*	*Mod*	*2*	*MODERATE*	*5*
OUTSIDE VIEWSHED								
VR10 - Farmstead	*4.1*							
VR116 - Farmstead	*4.7*							
VR63 - Farmstead	*4.0*							
VR68 - Farmstead	*2.5*							
VR82 - Farmstead	*4.5*							

^Receptor is inside the Hendrina North WEF Project Area
#Receptor is inside the Hendrina South WEF Project Area

Appendix C

IMPACT RATING METHODOLOGY

IMPACT ASSESSMENT METHODOLOGY

SCOPING PHASE

REPORTING REQUIREMENTS

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of Baseline Environment – including sensitivity mapping
- Identification and high-level screening of impacts
- Plan of Study for EIA

HIGH-LEVEL SCREENING OF IMPACTS AND MITIGATION

Appendix 2 of GNR 982, as amended, requires the identification of the significance of potential impacts during scoping. To this end, an impact screening tool has been used in the scoping phase. The screening tool is based on two criteria, namely probability; and, consequence (**Table 0-3**), where the latter is based on general consideration to the intensity, extent, and duration.

The scales and descriptors used for scoring probability and consequence are detailed in **Table 0-3** and **Table 0-2** respectively.

Table 0-1: Probability Scores and Descriptors

SCORE	DESCRIPTOR
4	**Definite**: The impact will occur regardless of any prevention measures
3	**Highly Probable**: It is most likely that the impact will occur
2	**Probable**: There is a good possibility that the impact will occur
1	**Improbable:** The possibility of the impact occurring is very low

Table 0-2: Consequence Score Descriptions

SCORE	NEGATIVE	POSITIVE
4	Very severe: An irreversible and permanent change to the affected system(s) or party(ies) which cannot be mitigated.	Very beneficial: A permanent and very substantial benefit to the affected system(s) or party(ies), with no real alternative to achieving this benefit.

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3	Severe: A long term impacts on the affected system(s) or party(ies) that could be mitigated. However, this mitigation would be difficult, expensive or time consuming or some combination of these.	Beneficial: A long term impact and substantial benefit to the affected system(s) or party(ies). Alternative ways of achieving this benefit would be difficult, expensive or time consuming, or some combination of these.
2	Moderately severe: A medium to long term impacts on the affected system(s) or party (ies) that could be mitigated.	Moderately beneficial: A medium to long term impact of real benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are equally difficult, expensive and time consuming (or some combination of these), as achieving them in this way.
1	Negligible: A short to medium term impacts on the affected system(s) or party(ies). Mitigation is very easy, cheap, less time consuming or not necessary.	Negligible: A short to medium term impact and negligible benefit to the affected system(s) or party(ies). Other ways of optimising the beneficial effects are easier, cheaper and quicker, or some combination of these.

Table 0-3: Significance Screening Tool

CONSEQUENCE SCALE

PROBABILITY SCALE		1	2	3	4
	1	Very Low	Very Low	Low	Medium
	2	Very Low	Low	Medium	Medium
	3	Low	Medium	Medium	High
	4	Medium	Medium	High	High

The nature of the impact must be characterised as to whether the impact is deemed to be positive (+ve) (i.e. beneficial) or negative (-ve) (i.e. harmful) to the receiving environment/receptor. For ease of reference, a colour reference system (**Table 0-4**) has been applied according to the nature and significance of the identified impacts.

Table 0-4: Impact Significance Colour Reference System to Indicate the Nature of the Impact

Negative Impacts (-ve)	Positive Impacts (+ve)
Negligible	Negligible
Very Low	Very Low
Low	Low
Medium	Medium
High	High

EIA PHASE

REPORTING REQUIREMENTS

- Project Description
- Legislative Context (as applicable)
- Assumptions and limitations
- Description of methodology (as required)
- Update and/or confirmation of Baseline Environment – including update and / or confirmation of sensitivity mapping
- Identification and description of Impacts
- Full impact assessment (including Cumulative)
- Mitigation measures
- Impact Statement

Ensure that all reports fulfil the requirements of the relevant Protocols.

ASSESSMENT OF IMPACTS AND MITIGATION

The assessment of impacts and mitigation evaluates the likely extent and significance of the potential impacts on identified receptors and resources against defined assessment criteria, to develop and describe measures that will be taken to avoid, minimise or compensate for any adverse environmental impacts, to enhance positive impacts, and to report the significance of residual impacts that occur following mitigation.

The key objectives of the risk assessment methodology are to identify any additional potential environmental issues and associated impacts likely to arise from the proposed project, and to propose a significance ranking. Issues / aspects will be reviewed and ranked against a series of significance criteria to identify and record interactions between activities and aspects, and resources and receptors to provide a detailed discussion of impacts. The assessment considers direct[1], indirect[2], secondary[3] as well as cumulative[4] impacts.

A standard risk assessment methodology is used for the ranking of the identified environmental impacts pre-and post-mitigation (i.e. residual impact). The significance of environmental aspects is determined and ranked by considering the criteria[5] presented in **Table 0-5**.

Table 0-5: Impact Assessment Criteria and Scoring System

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Magnitude (M) The degree of alteration of the affected environmental receptor	Very low: No impact on processes	Low: Slight impact on processes	Medium: Processes continue but in a modified way	High: Processes temporarily cease	Very High: Permanent cessation of processes

[1] Impacts that arise directly from activities that form an integral part of the Project.
[2] Impacts that arise indirectly from activities not explicitly forming part of the Project.
[3] Secondary or induced impacts caused by a change in the Project environment.
[4] Impacts are those impacts arising from the combination of multiple impacts from existing projects, the Project and/or future projects.
[5] The definitions given are for guidance only, and not all the definitions will apply to all the environmental receptors and resources being assessed. Impact significance was assessed with and without mitigation measures in place.

CRITERIA	SCORE 1	SCORE 2	SCORE 3	SCORE 4	SCORE 5
Impact Extent (E) The geographical extent of the impact on a given environmental receptor	Site: Site only	Local: Inside activity area	Regional: Outside activity area	National: National scope or level	International: Across borders or boundaries
Impact Reversibility (R) The ability of the environmental receptor to rehabilitate or restore after the activity has caused environmental change	Reversible: Recovery without rehabilitation		Recoverable: Recovery with rehabilitation		Irreversible: Not possible despite action
Impact Duration (D) The length of permanence of the impact on the environmental receptor	Immediate: On impact	Short term: 0-5 years	Medium term: 5-15 years	Long term: Project life	Permanent: Indefinite
Probability of Occurrence (P) The likelihood of an impact occurring in the absence of pertinent environmental management measures or mitigation	Improbable	Low Probability	Probable	Highly Probability	Definite
Significance (S) is determined by combining the above criteria in the following formula:	$[S = (E + D + R + M) \times P]$ $Significance = (Extent + Duration + Reversibility + Magnitude) \times Probability$				
IMPACT SIGNIFICANCE RATING					
Total Score	**4 to 15**	**16 to 30**	**31 to 60**	**61 to 80**	**81 to 100**
Environmental Significance Rating (Negative (-))	**Very low**	**Low**	**Moderate**	**High**	**Very High**
Environmental Significance Rating (Positive (+))	**Very low**	**Low**	**Moderate**	**High**	**Very High**

IMPACT MITIGATION

The impact significance without mitigation measures will be assessed with the design controls in place. Impacts without mitigation measures in place are not representative of the proposed development's actual extent of impact and are included to facilitate understanding of how and why mitigation measures were identified. The residual impact is what remains following the application of mitigation and management measures and is thus the final level of impact associated with the development. Residual impacts also serve as the focus of management and monitoring activities during Project implementation to verify that actual impacts are the same as those predicted in this report.

The mitigation measures chosen are based on the mitigation sequence/hierarchy which allows for consideration of five (5) different levels, which include avoid/prevent, minimise, rehabilitate/restore, offset and no-go in that order. The idea is that when project impacts are considered, the first option should be to avoid or prevent the impacts from occurring in the first place if possible, however, this is not always feasible. If this is not attainable, the impacts can be allowed, however they must be minimised as far as possible by considering reducing the footprint of the development for example so that little damage is encountered. If impacts are unavoidable, the next goal is to rehabilitate or restore the areas impacted back to their original form after project completion. Offsets are then considered if all the other measures described above fail to remedy high/significant residual negative impacts. If no offsets can be achieved on a potential impact, which results in full destruction of any ecosystem for example, the no-go option is considered so that another activity or location is considered in place of the original plan.

The mitigation sequence/hierarchy is shown in **Figure 1** below.

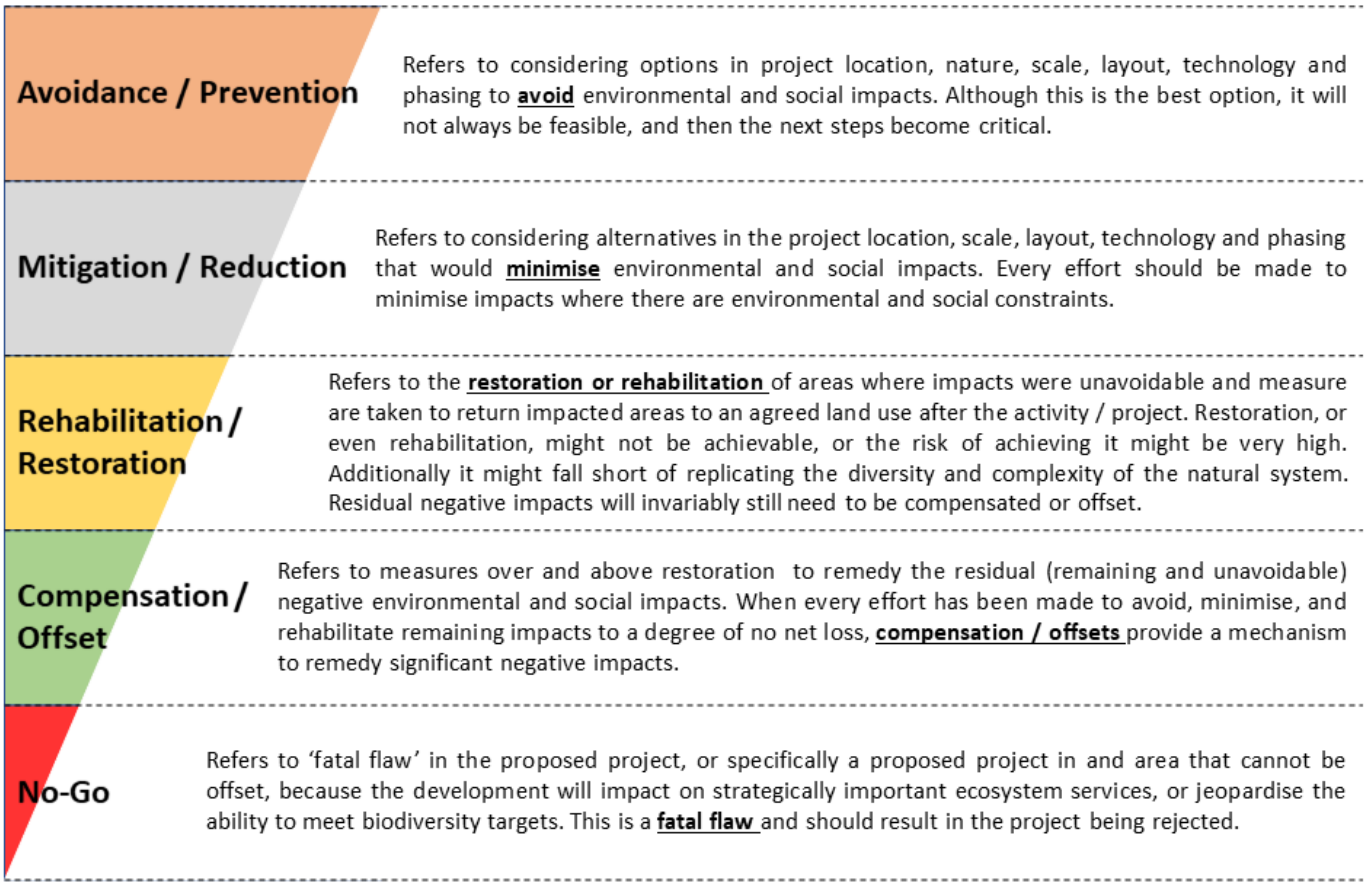


Figure 1: Mitigation Sequence/Hierarchy

Appendix D

COMPARATIVE ASSESSMENT OF ALTERNATIVES

Table 1: Comparative Assessment of Alternatives – Hendrina Hydrogen Ammonia Production Facility

Alternative	Preference	Reasons (incl. potential issues)
HENDRINA GHAF ALTERNATIVE 1		
GHAF Site Alternative 1	Favourable	▪ Alternative 1 is located on slightly sloping terrain but would only be marginally exposed on the skyline. ▪ There are no *sensitive* receptors within 5km of this alternative. ▪ The closest potentially sensitive receptor to this corridor (VR46) is 1.0km away and is expected to be subjected to moderate levels of visual impact as a result of the facility. ▪ The remaining receptors are all more than 1.5km away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site Alternative 1 and this alternative is considered **Favourable** from a visual perspective.
Site 1 OHL Option 1	Favourable	▪ Powerline Corridor (Site 1) Option 1 is up to 2 km in length, linking GHAF site alternative 1 to Hendrina North WEF substation Option 1. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ The closest potentially sensitive receptor to this corridor (VR46) is 1.1km away and is expected to be subjected to moderate levels of visual impact as a result of the facility. ▪ The remaining receptors are all more than 1.8km away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 1 OHL Option 1 and this alternative is considered **Favourable** from a visual perspective
Site 1 OHL Option 2	Least Preferred	▪ Powerline Corridor (Site 1) Option 2 is up to 7 km in length, linking GHAF site alternative 1 to Hendrina North WEF substation Option 2. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ Two receptors are located inside the assessment corridor for OHL option 2, namely VR26 and VR91. Accordingly, these receptors are expected to be subjected to high levels of visual impact as a result of the OHLs. However, both of these receptors are located within the Hendrina North WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 600m away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 1 OHL Option 2 although this site is considered **Least Preferred** from a visual perspective due to its proximity to a greater number of receptors.

Alternative	Preference	Reasons (incl. potential issues)
Site 1 OHL Option 3	Favourable	▪ Powerline Corridor (Site 1) Option 3 is up to 1.5 km in length, linking GHAF site alternative 1 to Hendrina South WEF substation. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ The closest potentially sensitive receptor to this corridor (VR46) is 1.1km away and is expected to be subjected to moderate levels of visual impact as a result of the facility. ▪ The remaining receptors are all more than 1.6km away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 1 OHL Option 3 and this alternative is considered **Favourable** from a visual perspective
HENDRINA GHAF ALTERNATIVE 2		
GHAF Site Alternative 2	Favourable	▪ Alternative 2 is located on slightly elevated terrain and would be marginally exposed on the skyline. ▪ There are no *sensitive* receptors within 5km of this alternative. ▪ The closest potentially sensitive receptor to this corridor (VR87) is 1.2km away and is expected to be subjected to moderate levels of visual impact as a result of the substation. However, this receptor is located within the Hendrina South WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 2km away and would experience low to negligible levels of visual impact. ▪ There are no fatal flaws associated with Site Alternative 2 and this alternative is considered **Favourable** from a visual perspective.
Site 2 OHL Option 1	Favourable	▪ Powerline Corridor (Site 2) Option 1 is up to 3 km in length, linking GHAF site alternative 2 to Hendrina North WEF substation Option 1. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ The closest potentially sensitive receptor to this corridor (VR87) is 1.2km away and is expected to be subjected to moderate levels of visual impact as a result of the facility. However, this receptor is located within the Hendrina South WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 2km away and would experience low to negligible levels of visual impact. ▪ There are no fatal flaws associated with Site 2 OHL Option 1 and this alternative is considered **Favourable** from a visual perspective

Alternative	Preference	Reasons (incl. potential issues)
Site 2 OHL Option 2	Least Preferred	▪ Powerline Corridor (Site 2) Option 2 is up to 8 km in length, linking GHAF site alternative 2 to Hendrina North WEF substation Option 2. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ Two receptors are located inside the assessment corridor for OHL option 2, namely VR26 and VR91. Accordingly, these receptors are expected to be subjected to high levels of visual impact as a result of the OHLs. However, both of these receptors are located within the Hendrina North WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 600m away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 2 OHL Option 2 although this site is considered **Least Preferred** from a visual perspective due to its proximity to a greater number of receptors.
Site 2 OHL Option 3	Favourable	▪ Powerline Corridor (Site 2) Option 3 is up to 0.5 km in length, linking GHAF site alternative 2 to Hendrina South WEF substation. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ The closest potentially sensitive receptor to this corridor (VR87) is 1.2km away and is expected to be subjected to moderate levels of visual impact as a result of the facility. However, this receptor is located within the Hendrina South WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 1.9km away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 2 OHL Option 3 and this alternative is considered **Favourable** from a visual perspective
HENDRINA GHAF ALTERNATIVE 3		
GHAF Site Alternative 3	Least Preferred	▪ Alternative 3 is located on slightly elevated terrain and would be marginally exposed on the skyline. ▪ There are no *sensitive* receptors within 5km of this alternative. ▪ The closest potentially sensitive receptor to this corridor (VR90) is 730m away and is expected to be subjected to moderate levels of visual impact as a result of the substation. However, this receptor is located within the Hendrina North WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light.

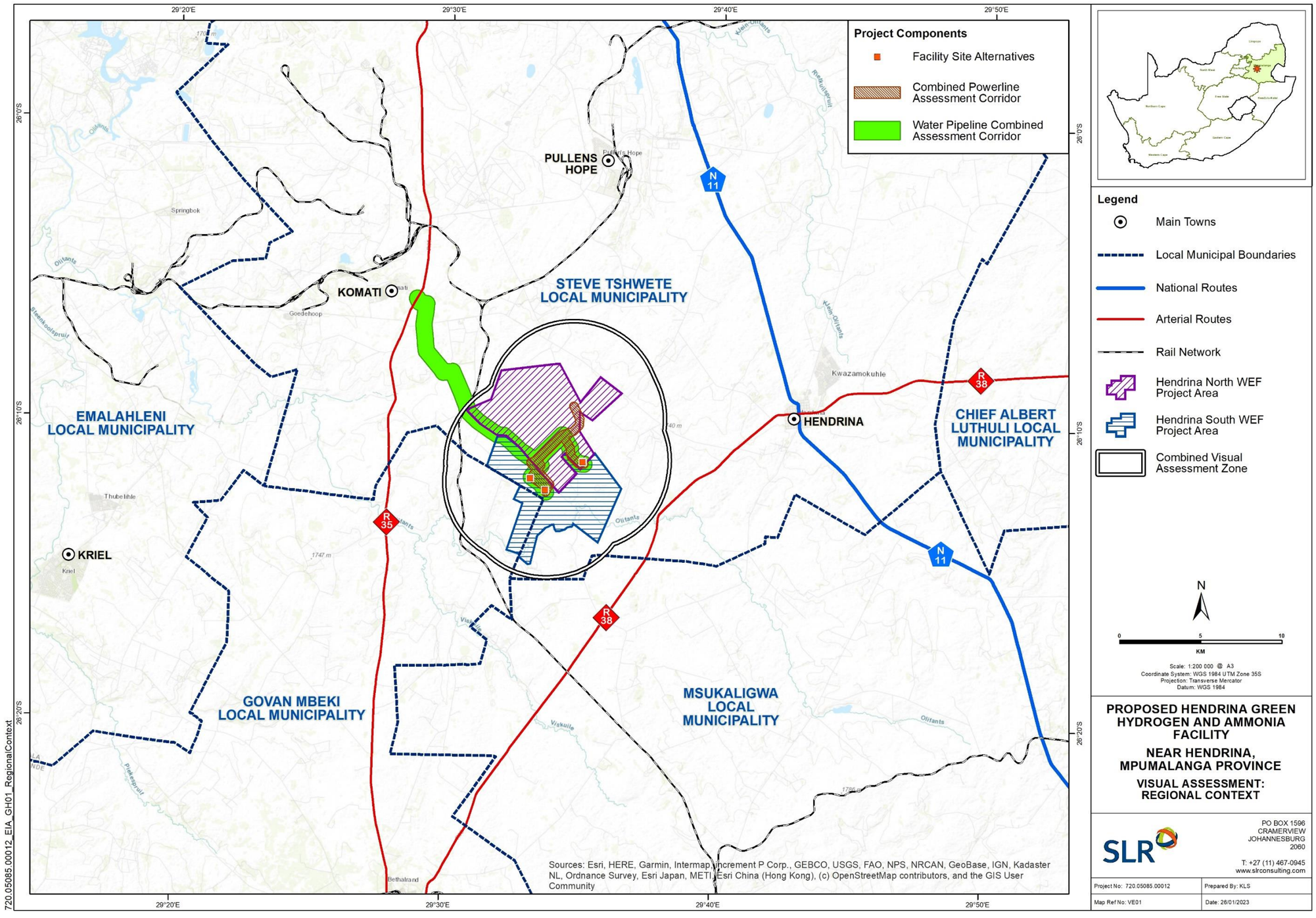
Alternative	Preference	Reasons (incl. potential issues)
		▪ There are four receptors within 2km of this site alternative that will be subject to moderate levels of impact. ▪ The remaining receptors are all more than 2km away and would experience low to negligible levels of visual impact. ▪ There are no fatal flaws associated with Site Alternative although this site is considered **Least Preferred** from a visual perspective due to its proximity to a greater number of receptors.
Site 3 OHL Option 1	Favourable	▪ Powerline Corridor (Site 3) Option 1 is up to 5 km in length, linking GHAF site alternative 3 to Hendrina North WEF substation Option 1. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ One receptor is located inside the assessment corridor for OHL option 3, namely VR91. Accordingly, this receptor is expected to be subjected to high levels of visual impact as a result of the OHLs. However, this receptor is located within the Hendrina North WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 700m away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 3 OHL Option 1 and this alternative is considered **Favourable** from a visual perspective.
Site 3 OHL Option 2	Favourable	▪ Powerline Corridor (Site 3) Option 2 is up to 5 km in length, linking GHAF site alternative 3 to Hendrina North WEF substation Option 2. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline. ▪ There are no sensitive receptors within 5km of this alternative. ▪ Two receptors are located inside the assessment corridor for OHL option 2, namely VR26 and VR91. Accordingly, these receptors are expected to be subjected to high levels of visual impact as a result of the OHLs. However, both of these receptors are located within the Hendrina North WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 600m away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 3 OHL Option 2 although this site is considered **Favourable** from a visual perspective..
Site 3 OHL Option 3	Favourable	▪ Powerline Corridor (Site 3) Option 3 is up to 7 km in length, linking GHAF site alternative 3 to Hendrina South WEF substation. ▪ This route alignment traverses some areas of higher elevations and will be moderately exposed on the skyline.

Alternative	Preference	Reasons (incl. potential issues)
		▪ There are no sensitive receptors within 5km of this alternative. ▪ One receptor is located inside the assessment corridor for OHL option 3, namely VR91. Accordingly, this receptor is expected to be subjected to high levels of visual impact as a result of the OHLs. However, this receptor is located within the Hendrina North WEF project area and as such it is assumed that the land owners support the Hendrina Renewable Energy Complex project and are not expected to perceive the proposed development in a negative light. ▪ The remaining receptors are all more than 750m away and would experience moderate to low levels of visual impact. ▪ There are no fatal flaws associated with Site 3 OHL Option 1 and this alternative is considered **Favourable** from a visual perspective

Appendix E

Maps

MAP 1: Regional Context



PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY

NEAR HENDRINA, MPUMALANGA PROVINCE

VISUAL ASSESSMENT: REGIONAL CONTEXT

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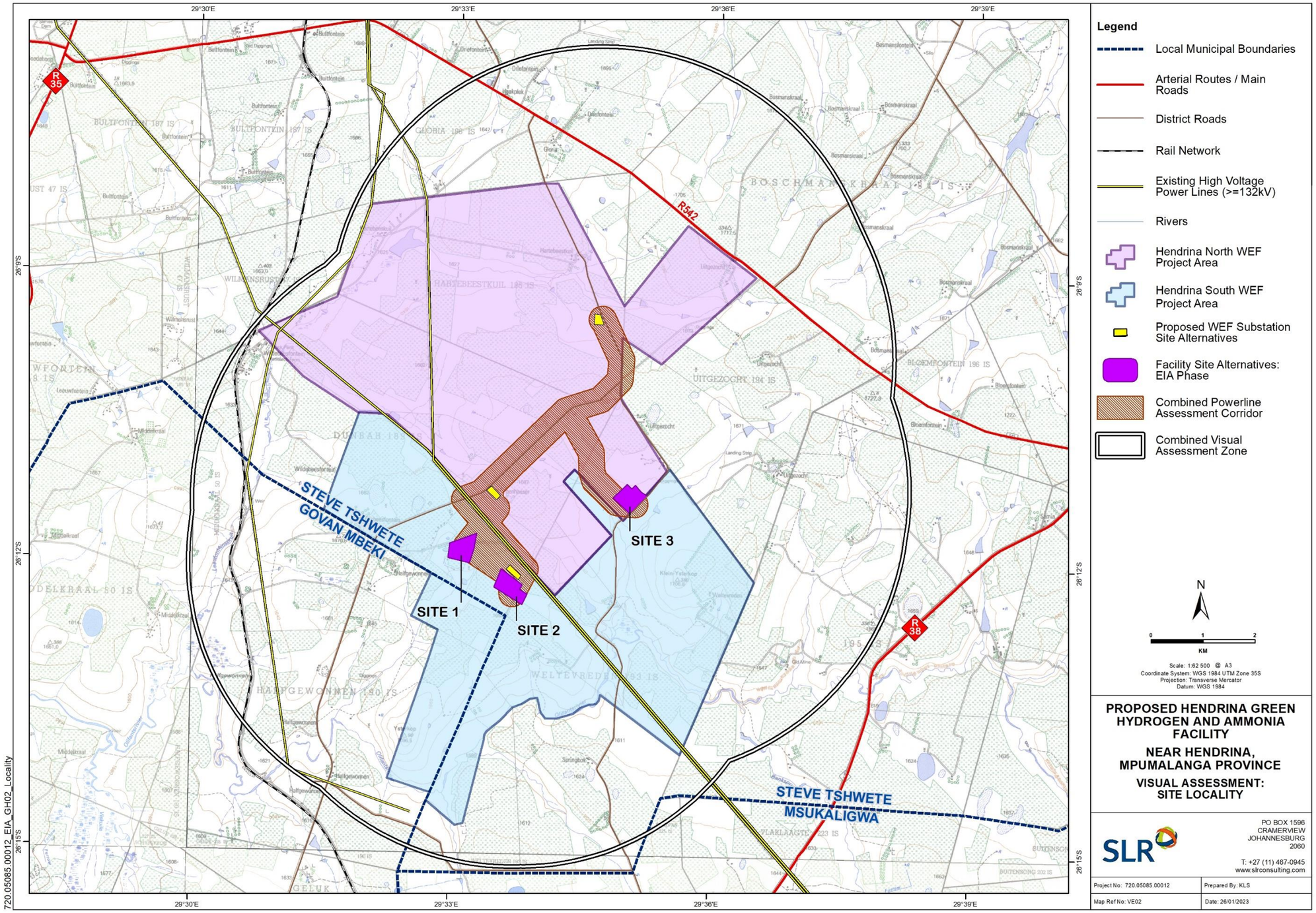
Map Ref No: VE01	Date: 28/01/2023

720.05085.00012_EIA_GH01_RegionalContext

MAP 2: Site Locality



Legend

- Local Municipal Boundaries
- Arterial Routes / Main Roads
- District Roads
- Rail Network
- Existing High Voltage Power Lines (>=132kV)
- Rivers
- Hendrina North WEF Project Area
- Hendrina South WEF Project Area
- Proposed WEF Substation Site Alternatives
- Facility Site Alternatives: EIA Phase
- Combined Powerline Assessment Corridor
- Combined Visual Assessment Zone

N

0 1 2
KM

Scale: 1:62 500 @ A3
Coordinate System: WGS 1984 UTM Zone 35S
Projection: Transverse Mercator
Datum: WGS 1984

PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY

NEAR HENDRINA, MPUMALANGA PROVINCE

VISUAL ASSESSMENT: SITE LOCALITY

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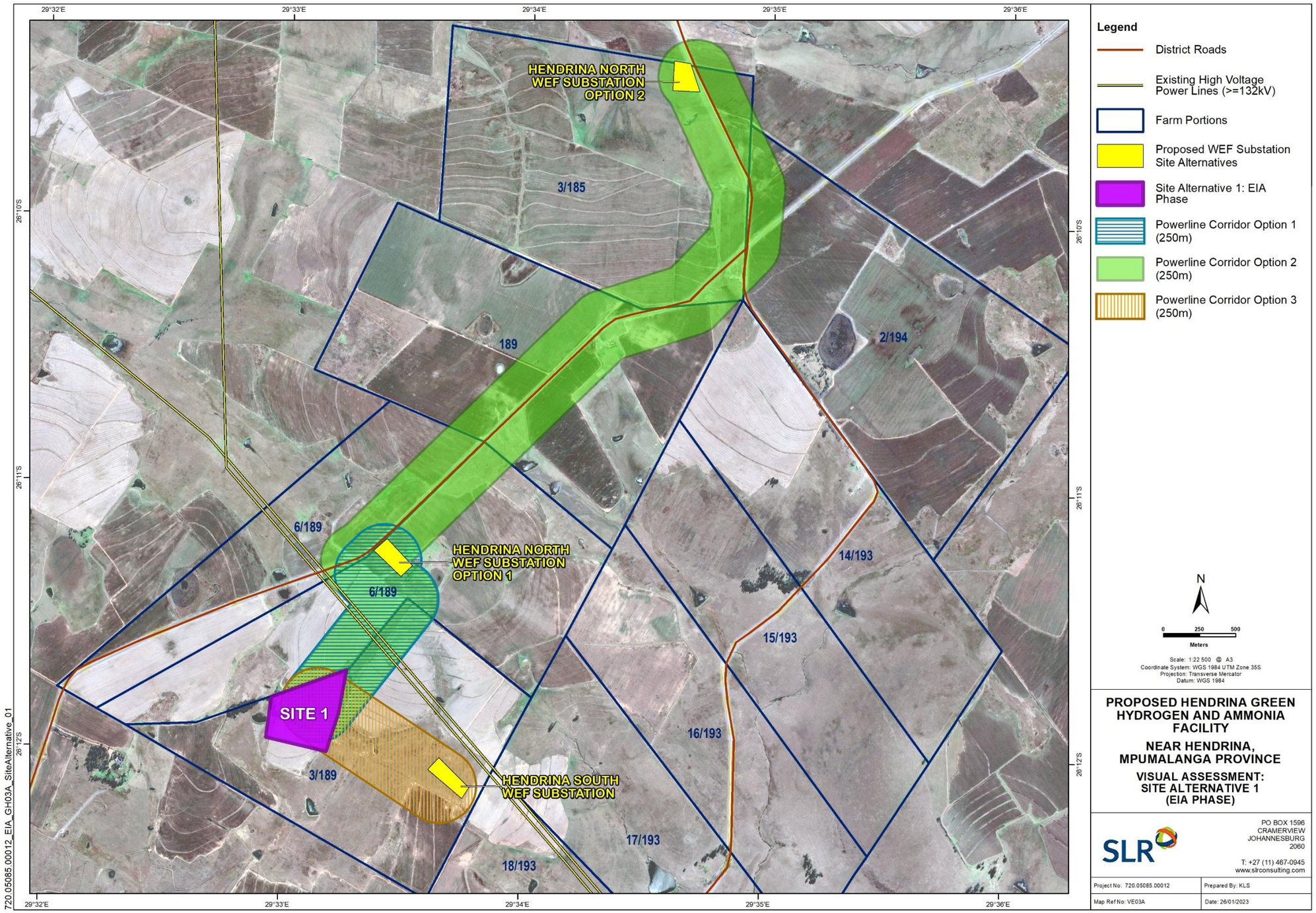
MAP 3A: Site Alternative 1



Legend

- District Roads
- Existing High Voltage Power Lines (>=132kV)
- Farm Portions
- Proposed WEF Substation Site Alternatives
- Site Alternative 1: EIA Phase
- Powerline Corridor Option 1 (250m)
- Powerline Corridor Option 2 (250m)
- Powerline Corridor Option 3 (250m)

N

0 250 500
Meters

Scale: 1:22 500 @ A3
Coordinate System: WGS 1984 UTM Zone 35S
Projection: Transverse Mercator
Datum: WGS 1984

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VISUAL ASSESSMENT: SITE ALTERNATIVE 1 (EIA PHASE)

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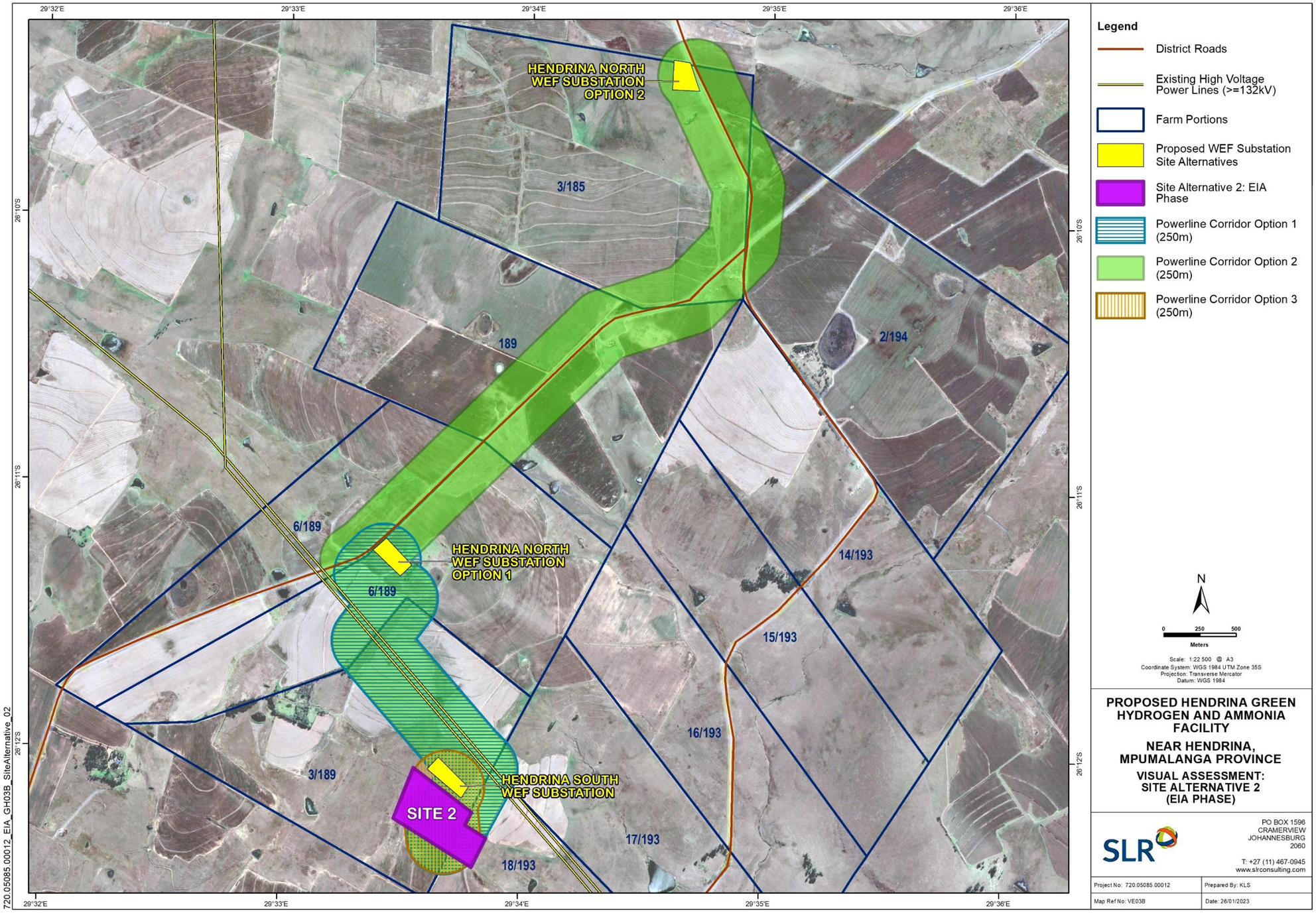
MAP 3B: Site Alternative 2



Legend

- District Roads
- Existing High Voltage Power Lines (>=132kV)
- Farm Portions
- Proposed WEF Substation Site Alternatives
- Site Alternative 2: EIA Phase
- Powerline Corridor Option 1 (250m)
- Powerline Corridor Option 2 (250m)
- Powerline Corridor Option 3 (250m)

N

0 250 500
Meters

Scale: 1:22,500 @ A3
Coordinate System: WGS 1984 UTM Zone 35S
Projection: Transverse Mercator
Datum: WGS 1984

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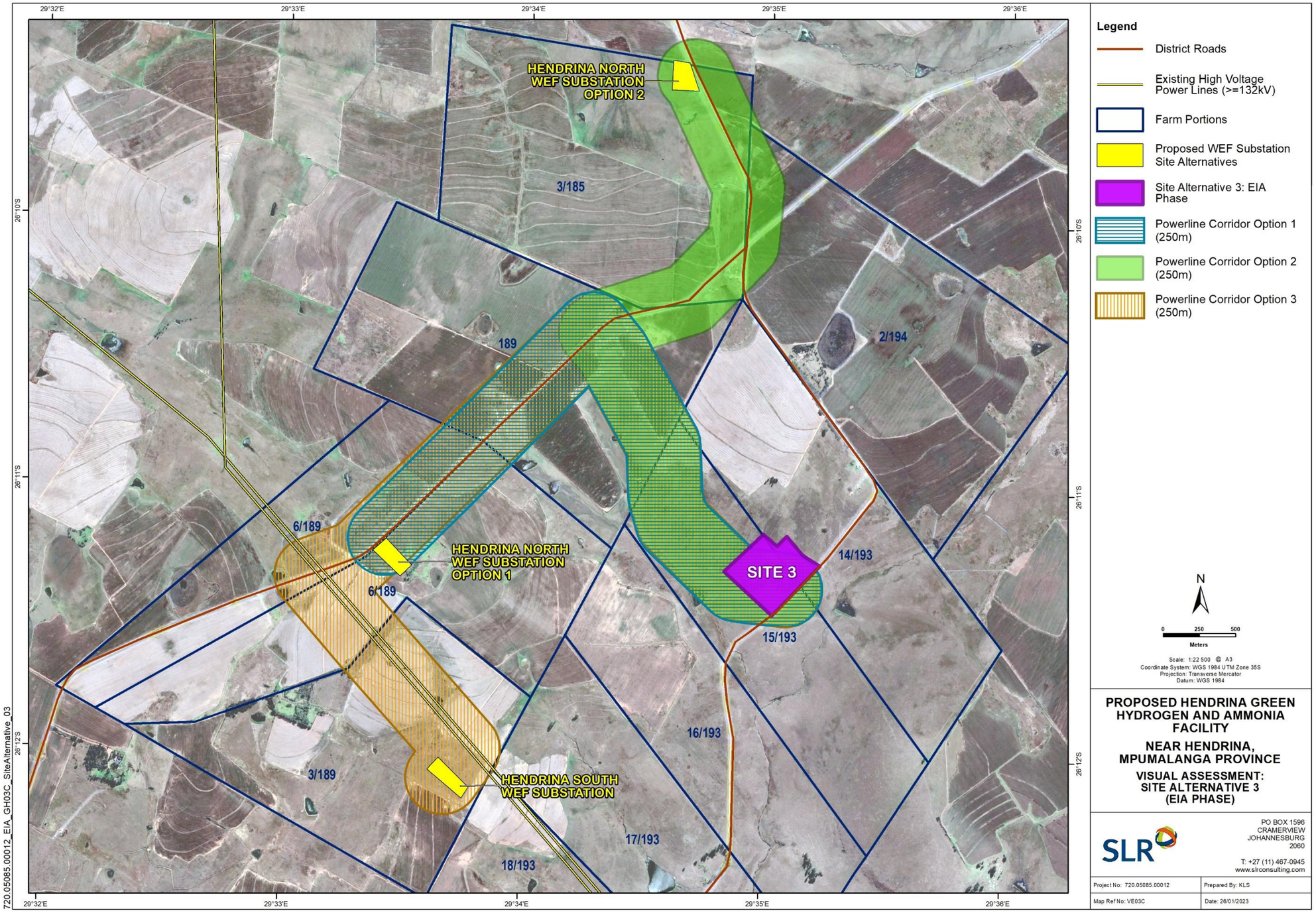
MAP 3C: Site Alternative 3



Legend

- District Roads
- Existing High Voltage Power Lines (>=132kV)
- Farm Portions
- Proposed WEF Substation Site Alternatives
- Site Alternative 3: EIA Phase
- Powerline Corridor Option 1 (250m)
- Powerline Corridor Option 2 (250m)
- Powerline Corridor Option 3 (250m)

N

0 250 500
Meters

Scale: 1:22 500 @ A3
Coordinate System: WGS 1984 UTM Zone 35S
Projection: Transverse Mercator
Datum: WGS 1984

PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY

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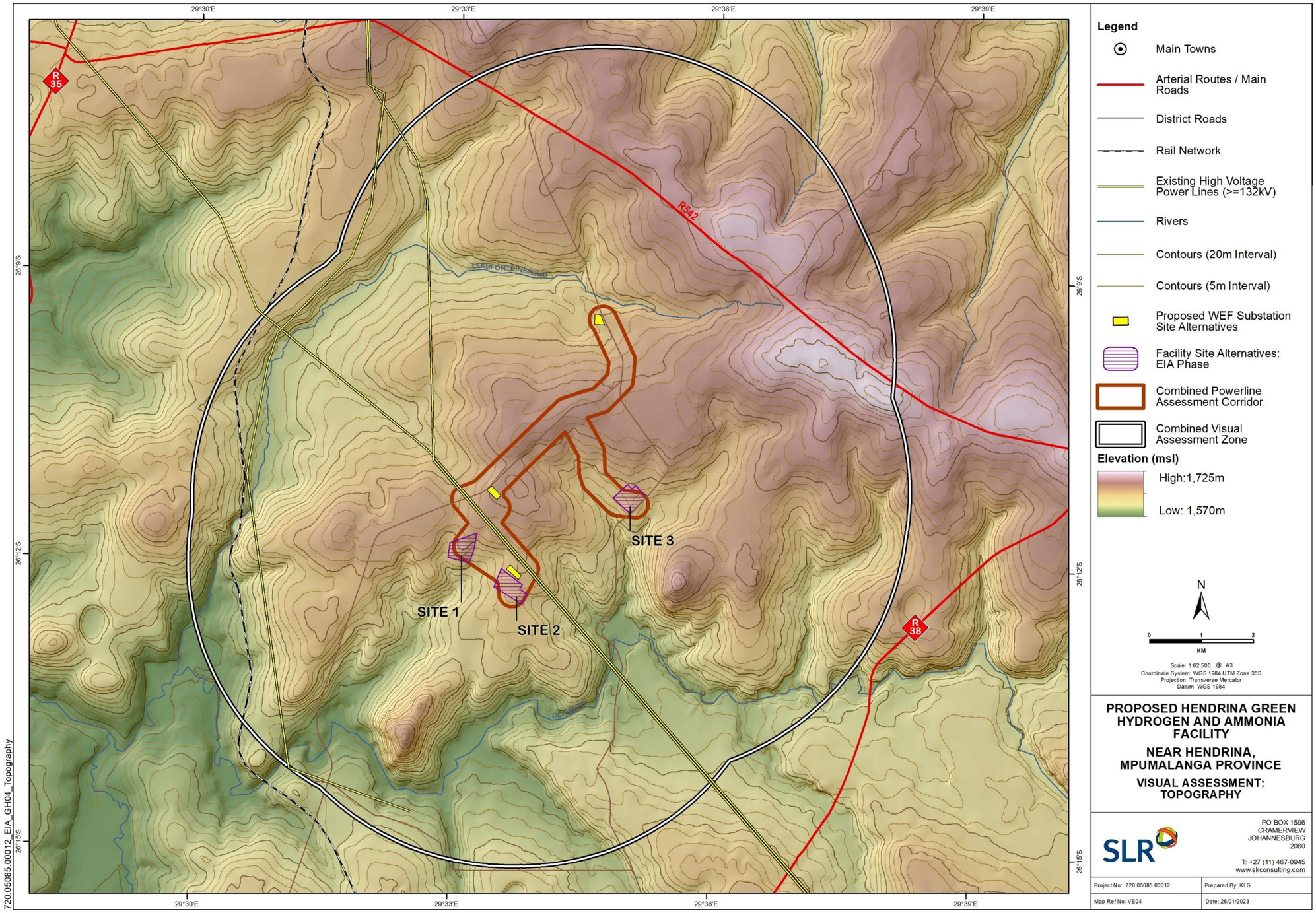
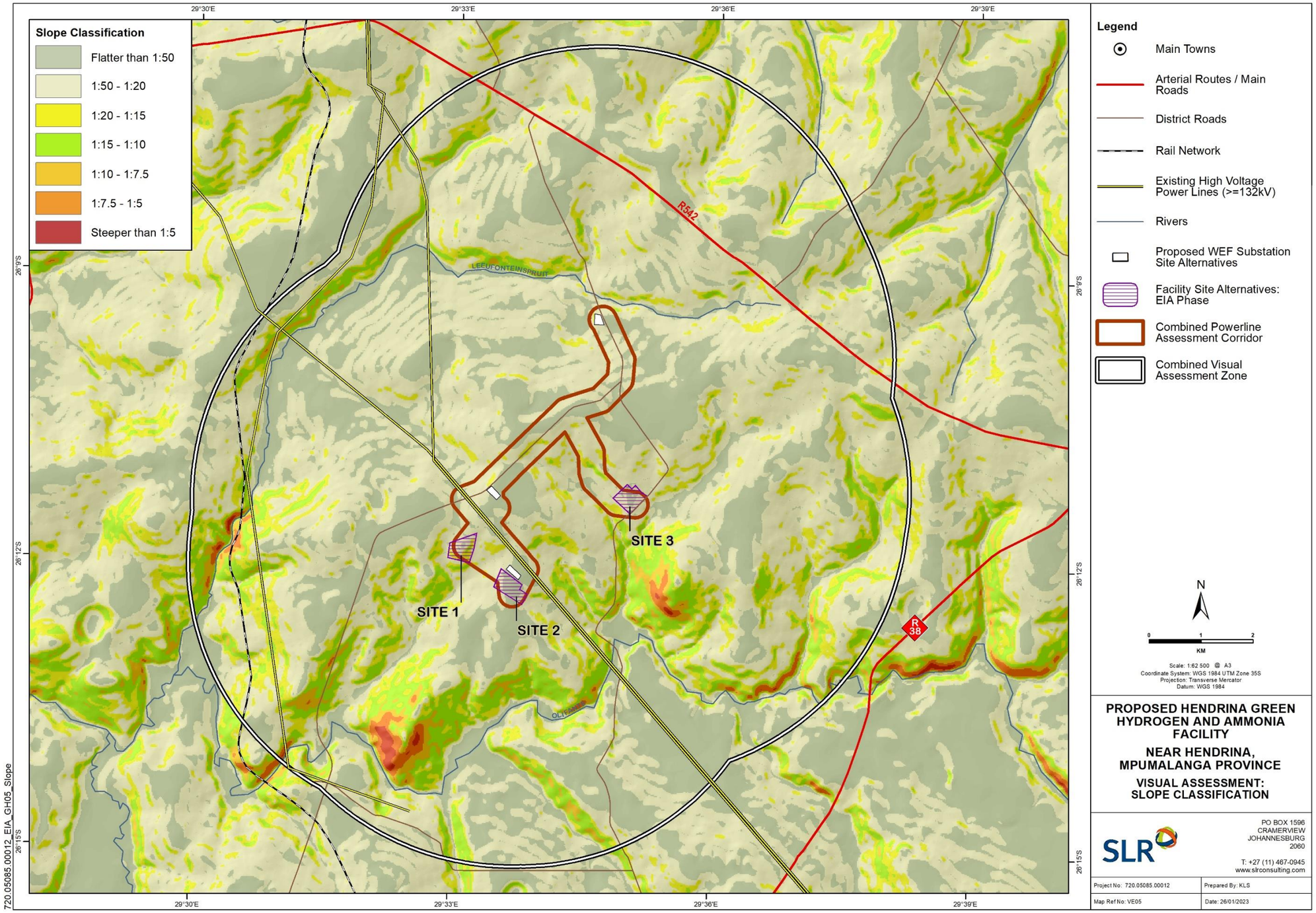
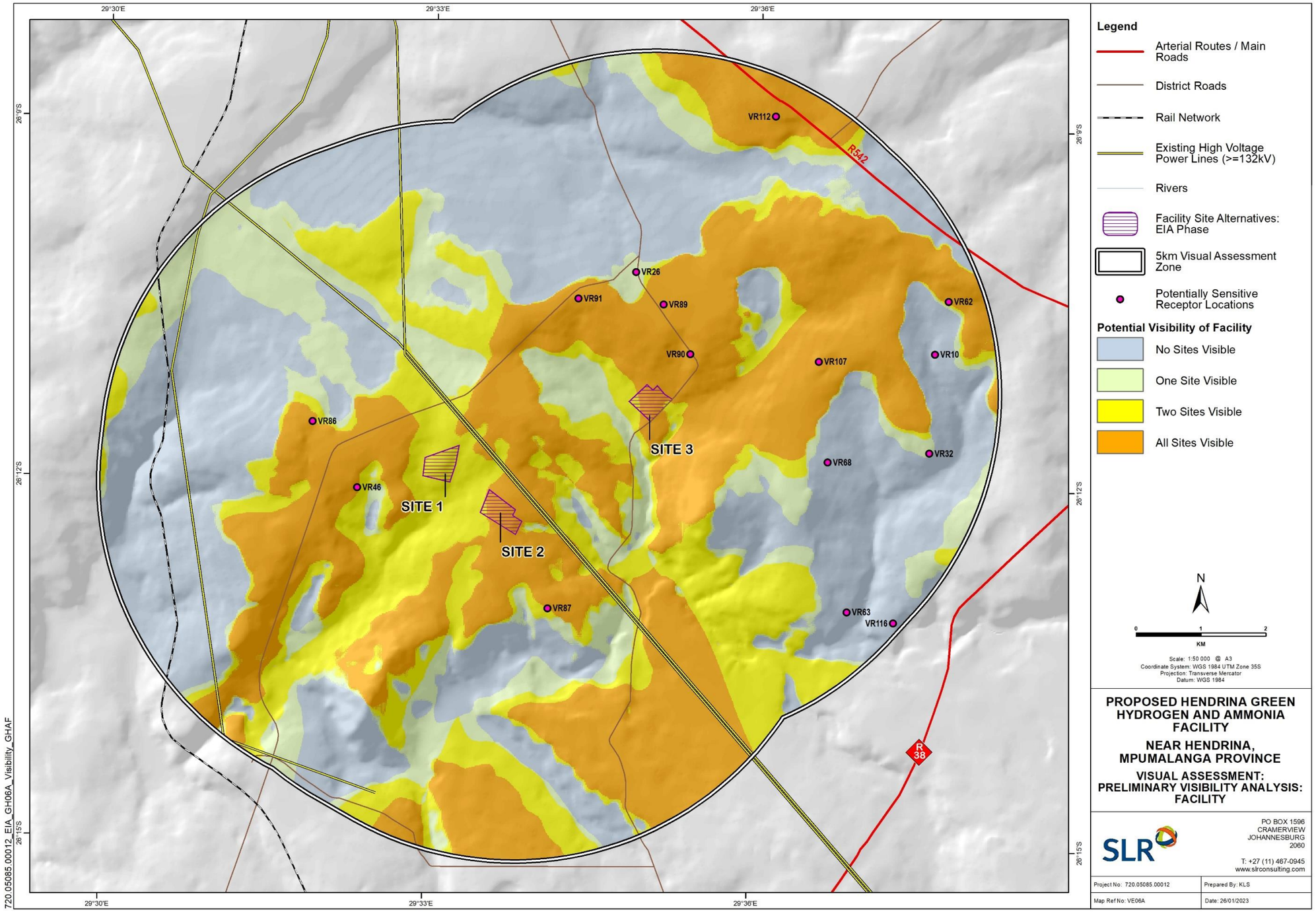
MAP 4: Topography



MAP 5: Slope Classification



MAP 6A: Potential Visibility of Facility



PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY

NEAR HENDRINA, MPUMALANGA PROVINCE

VISUAL ASSESSMENT: PRELIMINARY VISIBILITY ANALYSIS: FACILITY

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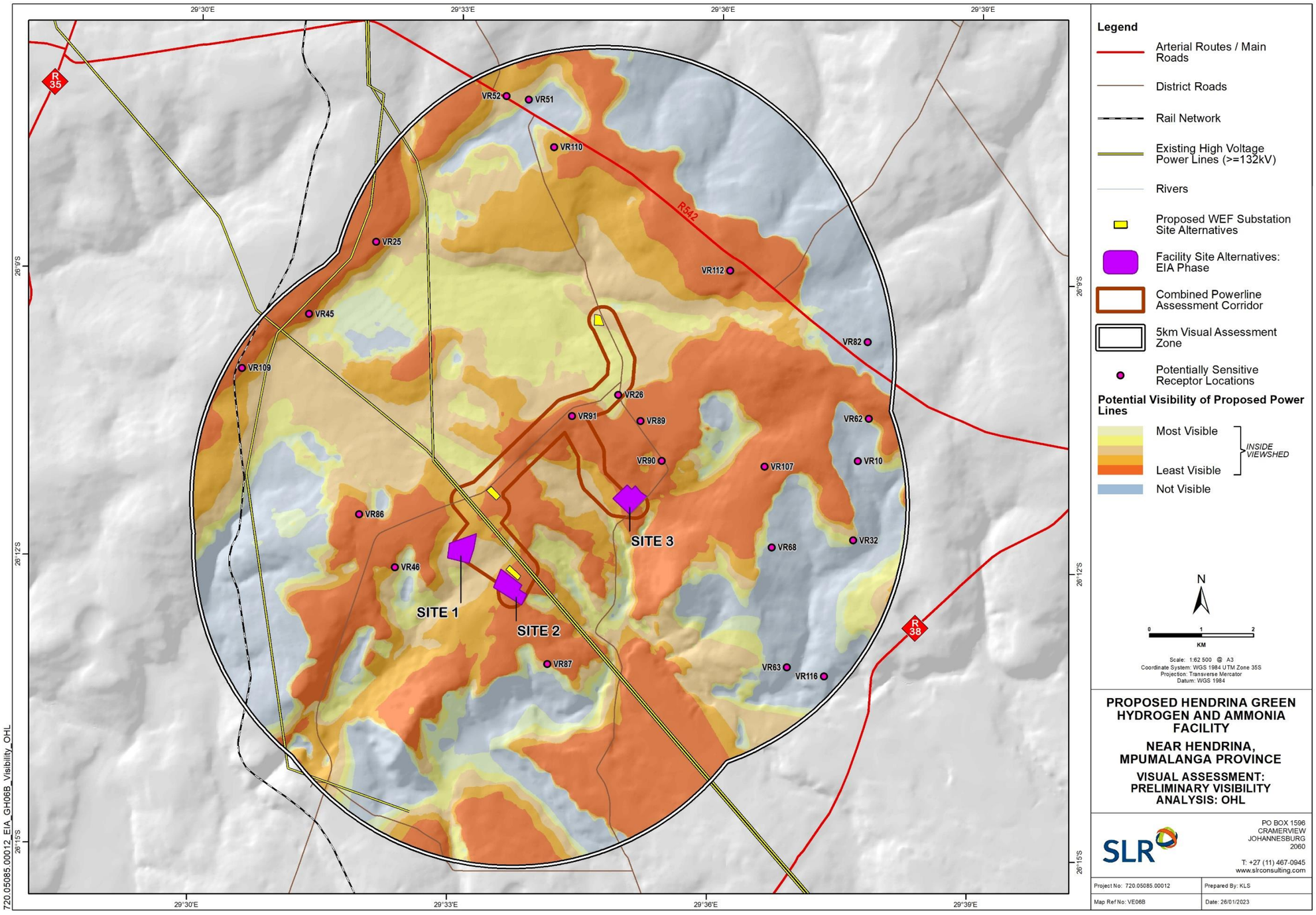
MAP 6B: Potential Visibility of OHL



PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY

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VISUAL ASSESSMENT: PRELIMINARY VISIBILITY ANALYSIS: OHL

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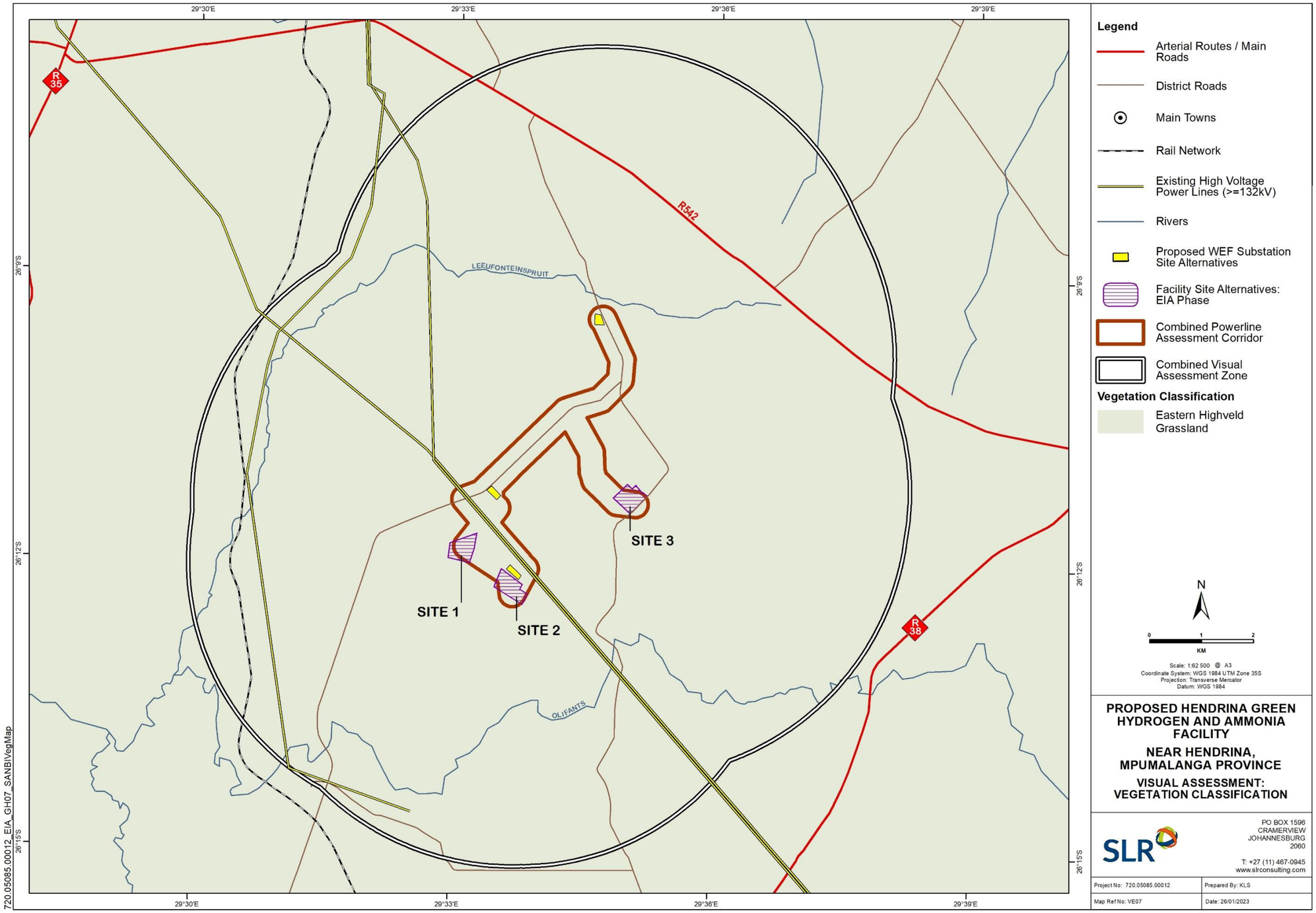
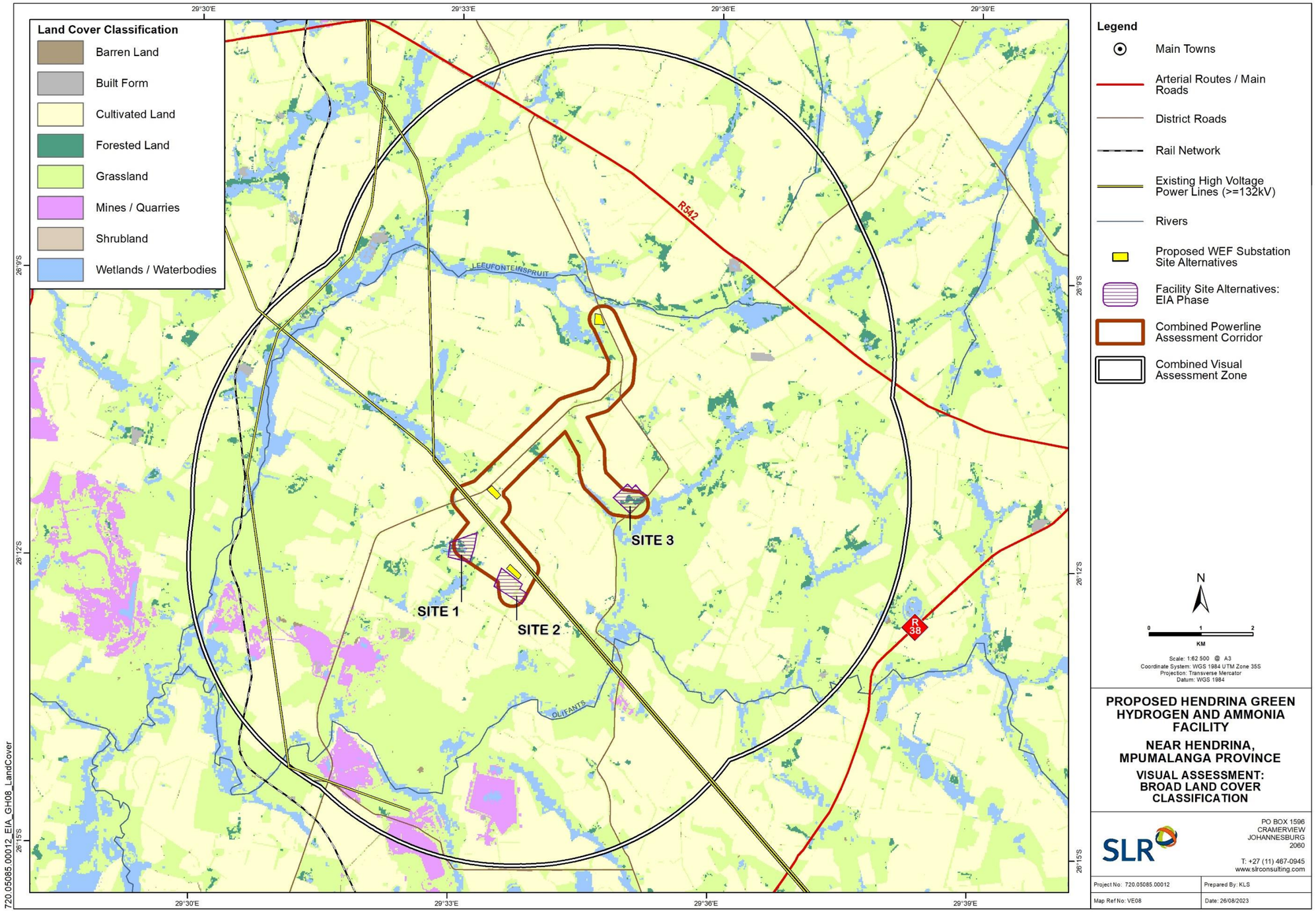
720.05085.00012_EIA_GH06B_Visibility_OHL

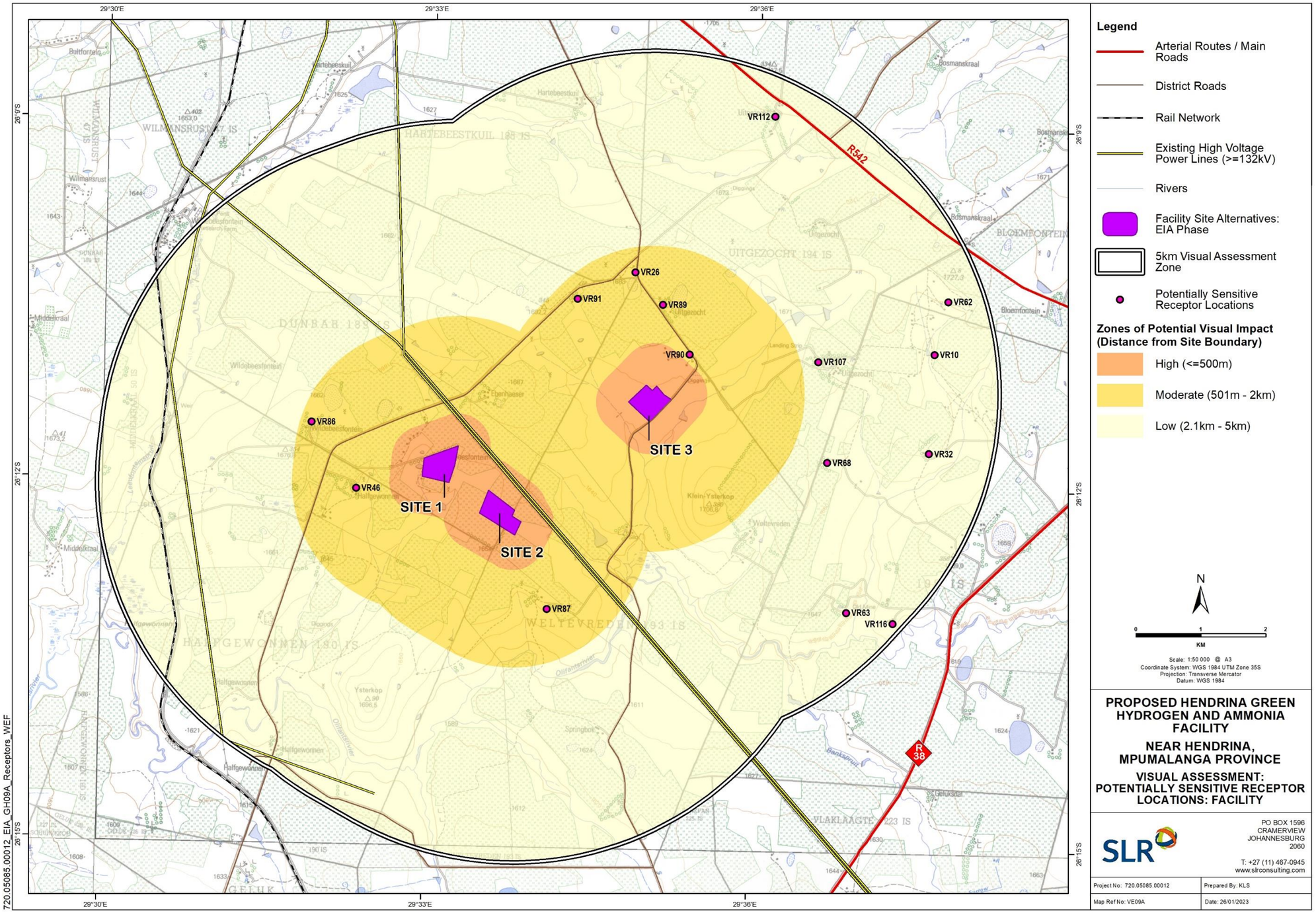
MAP 7: Vegetation Classification



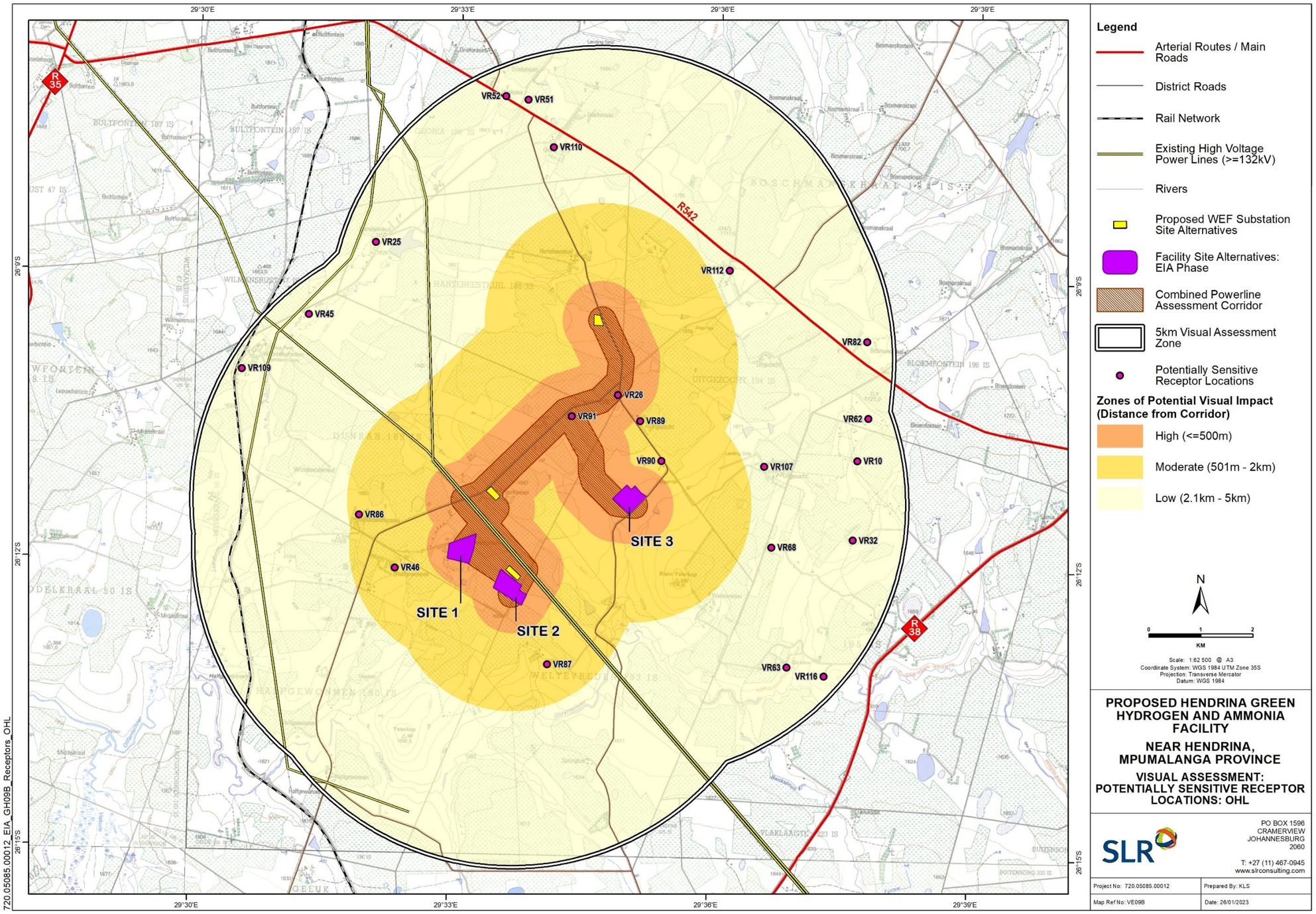
MAP 8: Land Cover Classification



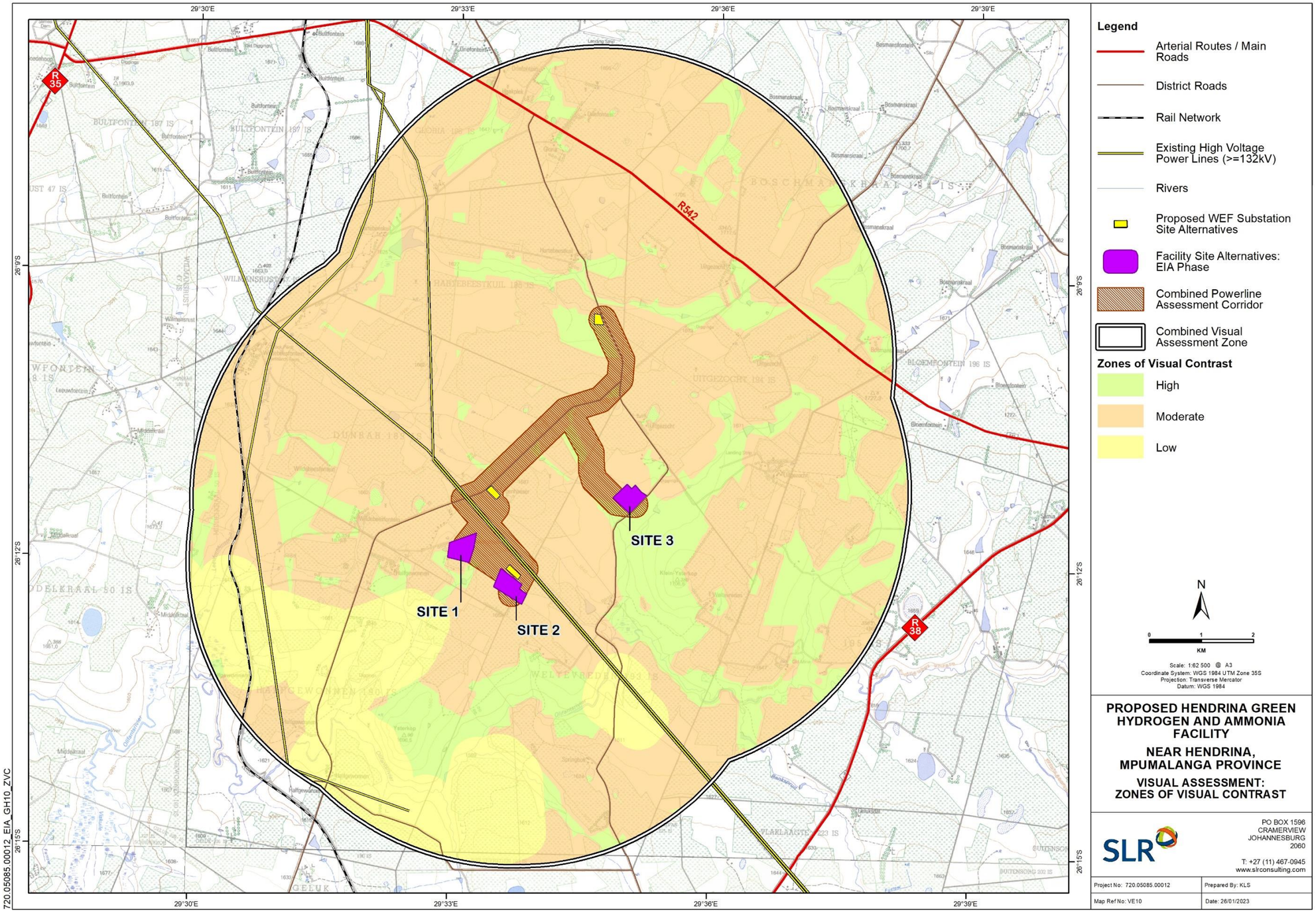
MAP 9A: Potentially Sensitive Receptor Locations within 5km of Facility



MAP 9B: Potentially Sensitive Receptor Locations within 5km of OHL Assessment Corridor



MAP 10: Zones of Visual Contrast



PROPOSED HENDRINA GREEN HYDROGEN AND AMMONIA FACILITY

NEAR HENDRINA, MPUMALANGA PROVINCE

VISUAL ASSESSMENT: ZONES OF VISUAL CONTRAST

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